The Veterinary Record

FOUNDED BY WILLIAM HUNTING, F.R.C.V.S., 1888.

No. 6. FEBRUARY 10, 1940. VOL. 52.

THE VIRULENCE OF BR. *ABORTUS* FOR LABORATORY ANIMALS AND PREGNANT CATTLE

A. D. McEWEN

VETERINARY DEPARTMENT, SOUTH-EASTERN AGRICULTURAL COLLEGE, WYE, KENT

The resistance of animals to *Br. abortus* infection may be increased by vaccination with living cultures of the organisms, but up to the present no satisfactory resistance has been obtained by vaccination with dead organisms or with extracts of *Br. abortus*. The objections to the inoculation of cattle with live vaccine on the ground that it may cause infection are well known. In order to try and overcome these objections attempts have been made to immunise cattle with cultures of reduced virulence ; animals have also been vaccinated at an early age in the expectation that persistent vaccination infection would be avoided. The literature on the controlled vaccination experiments of cattle suggests that the degree of immunity produced with live vaccine is proportional to the virulence of the strain from which the vaccine is prepared and studies at this laboratory show that the same relationship between the virulence of live vaccine and immunity exists when guinea-pigs are used as experimental animals. A knowledge of the virulence or infectivity of a strain for animals that are to be vaccinated with that strain is essential. Furthermore, if a correlation exists between virulence for laboratory animals and for cattle, tests on laboratory animals might serve as a subsidiary means for examining the virulence or infectivity of vaccine strains from time to time.

The infectivity or virulence of a number of strains of *Br. abortus* has been estimated and in the case of some of the strains this has been correlated with their infectivity for cattle. The toxicity of a number of the strains for mice has also been considered.

Methods

When field strains were examined, the first infectivity tests on guinea-pigs were made within a few days of the strains being isolated and the first or second subculture on artificial medium was used.

All strains examined were preserved for further reference where necessary by maintaining the cultures dried *in vacuo* over P_2O_5. When tests were made on preserved strains the second subculture from the dried state was used. The only medium used for the cultivation of the strains was liver agar. Suspensions of the bacteria were prepared by washing off 48-hour growths with sterile saline and adjusting the suspensions to the required opacity, using Brown's Scale. Serial dilutions of the suspensions were prepared using a separate pipette for each dilution.

Well-grown male or virgin female guinea-pigs were exposed to infection either by intramuscular inoculation into the thigh or by dropping a small quantity of bacterial suspension on to the surface of the eye and ensuring that the surface of the eye and the inner surface of the lids were wetted ; the excess suspension was removed. Four to six weeks after exposure to infection the animals were killed and cultural examinations were made of their spleens, the presence or absence of splenic enlargement and any other macroscopic lesions were noted and their sera were tested for agglutinins.

All the cattle used were pregnant for the first time when they entered the experiments. Bacteriological examinations were made on aborted foetuses, foetal membranes or uterine swabs, colostrum and milk. The sera were examined for agglutinins.

The toxicity of the strains for mice was tested by inoculating the animals intraperitoneally with suspensions of the organisms and the deaths among them during the first four days were recorded (Priestley and McEwen, 1938).

Four freshly isolated field strains were examined for their infectivity for guinea-pigs. The infectivity of one of the strains for cattle has already been reported on and will be referred to later (McEwen, Priestley and Paterson, 1939).

One rough and four smooth strains that had been subcultivated in this laboratory for periods of from two to five years since isolation were tested on guinea-pigs. A preliminary test indicated that the smooth strains were of average virulence. These smooth strains were then subcultivated at intervals of one to three days until each had been subcultivated more than 450 times when their infectivity for guinea-pigs was again tested.

Br. abortus strain 45 provided a strain of little or no virulence, and an attempt was made to resuscitate its virulence by passaging the strain through a series of guinea-pigs. Large doses of culture were inoculated subcutaneously, the guinea-pigs killed seven to ten days later when cultures were made from their spleens. From the spleen culture a subculture was obtained and inoculated into fresh animals and so on. During the earlier stages of passage the spleen cultures gave but a scanty growth of a few colonies only and sometimes they were sterile and the particular step that was concerned had to be repeated. Strain 45 is a smooth strain but during passage through guinea-pigs it became rough, subsequently reverting again to the smooth type. The passaged variants from this strain

that were examined in detail were of the smooth type except the 20th passage variant which was rough.

The results of the tests in which guinea-pigs were exposed to infection with four freshly isolated field strains are shown in Table I. Three of the strains tested were recovered from aborted foetuses and the fourth was cultivated from milk.

Intramuscular inoculation, as was to be expected, caused infection with higher dilutions of suspension than did the application of suspension to the eye. By the former route suspensions diluted $1 : 10^5$ infected all the animals and a high percentage of infection was also obtained with dilutions of $1 : 10^6$ and $1 : 10^7$ but at dilutions of $1 : 10^8$ the percentage of infected

TABLE I

SHOWING THE EFFECT OF EXPOSING GUINEA-PIGS TO INFECTION WITH DECREASING DOSES OF *Br. abortus*.

Method of Infection.	Strain 544. Time after Isolation when Strain was Tested.																				
	0 Weeks.			18 Weeks.			26 Weeks.			43 Weeks.			63 Weeks.			78 Weeks.			106 Weeks.		
Dilutions of Suspension of Organisms Equivalent to Brown's Tube No. 3.	No. Inoculated.	No. Infected.	Per cent.	No. Inoculated.	No. Infected.	Per cent.	No. Inoculated.	No. Infected.	Per cent.	No. Inoculated.	No. Infected.	Per cent.	No. Inoculated.	No. Infected.	Per cent.	No. Inoculated.	No. Infected.	Per cent.	No. Inoculated.	No. Infected.	Per cent.
Intramuscular :—																					
$1 : 10^5$	10	20	100	10	10	100				12	12	100				8	8	100			
$1 : 10^6$ ...	9	9	100	10	9	90				12	12	100	12	12	100	6	6	100	15	15	100
$1 : 10^7$ ...	10	10	100	10	8	80				12	10	83·3	12	12	100	9	9	100	14	14	100
$1 : 10^8$ ...	10	0	0	9	7	77·8				12	7	58·3	12	10	83·3	10	4	40	15	15	100
$1 : 10^9$ ...																8	0	0			
On Eye :—																					
N							9	9	100	12	12	100				10	10	100			
1 : 10 ...							9	9	100	12	12	100	10	9	90	10	9	90			
$1 : 10^2$ ...							10	6	60	10	7	70	11	10	90·9	8	6	75			
$1 : 10^3$ ...							12	6	50	11	3	27·3	8	1	12·5	12	1	8·3			
$1 : 10^4$ ...				5	0	0	10	0	0	10	1	10				8	0	0			
$1 : 10^5$ ...				5	0	0															

TABLE I (*Continued*)

Method of Infection.	Strain 817. Time after Isolation when Strain was Tested.												Strain 888.			Strain Alexander.		
	0 Weeks.			26 Weeks.			44 Weeks.			63 Weeks.			0 Weeks.			0 Weeks.		
Dilutions of Suspension of Organisms equivalent to Brown's Tube No. 3.	No. Inoculated.	No. Infected.	Per cent.	No. Inoculated.	No. Infected.	Per cent.	No. Inoculated.	No. Infected.	Per cent.	No. Inoculated.	No. Infected.	Per cent.	No. Inoculated.	No. Infected.	Per cent.	No. Inoculated.	No. Infected.	Per cent.
Intramuscular :—																		
$1 : 10^5$	10	10	100				11	11	100									
$1 : 10^6$	8	8	100				8	8	100	11	11	100	9	9	100	10	7	70
$1 : 10^7$	10	10	100				11	11	100	10	10	100	11	11	100	12	9	75
$1 : 10^8$	10	6	60				12	12	100	7	6	85·7	10	8	80	12	3	25
$1 : 10^9$													12	2	16·7	10	1	10
On Eye :—																		
N																		
1 : 10				10	10	100	12	12	100									
$1 : 10^2$				10	10	100	11	11	100	11	11	100						
$1 : 10^3$				10	6	60	11	10	90·9	10	10	100	10	7	70	12	12	100
$1 : 10^4$				10	5	50	9	2	22·2	6	1	16·7	12	1	8·3	7	4	57·1
$1 : 10^5$				8	0	0	11	0	0				10	0	0	12	1	8·3

animals showed great variation even where different suspensions of the same strain were used. By the eye route a small quantity of suspension diluted 1 : 10 caused infection of from 90 to 100 per cent. of the guinea-pigs and dilutions of 1 : 10^2 and 1 : 10^3 invariably infected a number of the animals, the percentage infected by the lower dilution being consistently the higher. The figures given suggest that in titrating the average infective dose a more definite result is obtained by applying the organisms in suspension to the surface of the eye than by inoculating them into the tissues.

Slight variations exist between the results obtained with the different freshly isolated strains but these are no greater than those that occur between different suspensions of the same strain. As variations of the latter type bear no correlation to the length of time after isolation of the strain, they are not attributable to any hypothetical loss of virulence since isolation. It is obvious that the test for infectivity as determined by the recovery of the organism from the spleen of guinea-pigs was insufficient to detect any difference in virulence between the four strains.

All four strains produced splenic enlargement to a comparable degree especially in the animals infected with the lower dilutions. None of the strains caused abscesses to form in the testicles or elsewhere. Small necrotic foci were occasionally found in the liver. All strains stimulated the appearance of serum agglutinins. None of the information obtained was, however, of value in differentiating the infectivity of virulence of one strain from another.

An old laboratory strain (Strain A.A.) which was rough was tested for infectivity for guinea-pigs. Table II shows that the strain was less infective than the field strain as the intramuscular inoculation of suspension diluted 1 : 10^6 either failed to infect or infected only a small percentage of the animals and suspensions diluted 1 : 10^2 and 1 : 10^3 did not infect any of the animals by the eye route. Furthermore, no splenic enlargement was shown by any of the infected animals.

A preliminary test on four smooth aerobic laboratory strains that had been subcultivated at intervals of four weeks for periods varying from two to five years showed

Table II

Showing the Results of Exposing Guinea-pigs to Infection with a Rough Laboratory Strain of *Br. abortus*.

Strain A.A.

Method of Infection.	Dilutions.*	No. Inoculated.	No. Infected.	Per cent.	No. Inoculated.	No. Infected.	Per cent.
Intramuscular ...	1 : 10^2	10	5	50	10	10	100
	1 : 10^3	9	3	33·3	9	5	55·6
	1 : 10^4	9	8	88·9	9	4	44·4
	1 : 10^5	9	2	22·2	10	8	80
	1 : 10^6	11	0	0	10	2	20
	1 : 10^7	12	0	0			
	1 : 10^8	11	0	0			
On Eye	N	9	7	77·8			
	1 : 10	9	5	55·6			
	1 : 10^2	5	0	0			
	1 : 10^3	12	0	0			
	1 : 10^4	12	0	0			

*Suspensions of organisms equivalent to Brown's No. 3 tube.

Table III

Showing the Effect of Exposing Guinea-pigs to Infection with repeatedly Subcultivated Laboratory Strains of *Br. abortus*.

Method of Infection.	Dilutions of Suspension of Organisms equivalent to Brown's No. 3 Tube.	Strain Russell 509th Subculture.			Strain 273, 484th Subculture.			Strain 161, 477th Subculture.			Strain 906, 484th Subculture.		
		No. Inoculated.	No. Infected.	Per cent.	No. Inoculated.	No. Infected.	Per cent.	No. Inoculated.	No. Infected.	Per cent.	No. Inoculated.	No. Infected.	Per cent.
Intramuscular :	1 : 10^4	12	12	100	10	10	100	10	10	100	12	12	100
	1 : 10^5	5	4	80	11	11	100	9	8	88·9	12	12	100
	1 : 10^6	12	12	100	12	12	100	7	6	85·7	12	12	100
	1 : 10^7	12	10	83·3	11	9	81·8	10	7	70	11	10	90·9
	1 : 10^8	12	5	41·7	12	8	66·7	12	6	50	12	6	50
	1 : 10^9	13	1	7·7	11	1	9	12	0	0	14	0	0
On eye ...	1 : 10	10	10	100	9	8	38·9	12	9	75	11	11	100
	1 : 10^2	8	1	12·5	9	5	55·6	11	9	81·8	10	8	80
	1 : 10^3	11	2	16·7	10	0	0	11	2	18·2	11	4	36·4
	1 : 10^4	12	0	0	12	0	0	12	0	0	12	0	0

that the strains were infective for guinea-pigs. In the anticipation that virulence might be reduced by subcultivation and strains of low virulence suitable for immunisation experiments obtained, the four strains were repeatedly subcultivated for a period of over two years. The strains retained their smooth character throughout this period and when finally tested on guinea-pigs they were found to be no less infective than the four freshly isolated CO_2- sensitive field strains and to produce comparable lesions in infected animals. (See Table III, previous page.)

The toxicity of the four repeatedly subcultivated strains was tested by inoculating mice intraperitoneally with suspensions of the organisms. The results of these tests are given in Table IV and they show that all the strains were toxic for mice and no less toxic than the two field strains 544 and 817, details of which were reported in a former article. (Priestley and McEwen, 1938.)

McEwen and Roberts (1936) and McEwen and Priestley (1938) have shown that *Br. abortus* strain 45 is of very low infectivity for guinea-pigs. Guinea-pigs inoculated either intramuscularly or subcutaneously with 1 c.c. of a suspension of organisms of this strain, equivalent in opacity to tube 3 of the Brown Scale, show no evidence of splenic infection when killed and examined bacteriologically three or more weeks later. The infectivity of the strain has, however, been increased by serial passage through guinea-pigs and tests have been made with the 6th, 20th, 30th and 40th passage variants.

The results of some of these tests are summarised in Table V and it will be seen that the 6th passage variant is more infective than the original strain as some of the guinea-pigs were found infected four to five weeks and even longer after intramuscular inoculation with relatively high dilutions. Furthermore, although the infectivity of the variant by the eye route is very low, nevertheless it was shown to be possible to infect animals in this way whereas attempts to infect animals by the eye route with strain 45 have never been successful.

On intramuscular inoculation the 20th passage variant gave results that in one instance were very similar to those obtained with the 6th passage variant and the comparative tests were insufficient to justify

Table IV

Showing the Toxicity of repeatedly Subcultivated Laboratory Strains of *Br. abortus* for Mice.

Strain.	No. of Organisms Inoculated in Thousand Millions.							
	16	8	4	2	1	0·5	0·25	0·125
Russell (509)	5	5	5	5	5	1	0	0
273 (484)	5	4	5	5	5	5	0	0
161 (477)	4	5	5	5	5	3	3	0
906 (484)	5	5	5	5	5	5	2	0

Figures = Numbers dying out of 5 inoculated.

Table V

Showing the Effect of Exposing Guinea-pigs to Infection with Guinea-pig Passage Variants of Strain 45.

Method of Infection.	Dilution.*	45 (6)			45 (20)						45 (30)			45 (40)					
		No. Inoculated.	No. Infected.	Per cent.	No. Inoculated.	No. Infected.	Per cent.	No. Inoculated.	No. Infected.	Per cent.	No. Inoculated.	No. Infected.	Per cent.	No. Inoculated.	No. Infected.	Per cent.	No. Inoculated.	No. Infected.	Per cent.
Intra-muscular	N	9	9	100	11	6	54·5	10	7	70				10	4	40	12	11	91·7			
	1 : 10	6	4	66·7	8	6	75	10	8	80				11	10	90·9	12	12	100			
	1 : 10^2	12	9	75	11	9	81·8	12	10	83·3				12	4	33·3	12	12	100			
	1 : 10^3	6	1	16·7	8	1	12·5	12	10	83·3				12	5	41·7	12	12	100			
	1 : 10^4	8	2	25	9	4	44·4	12	10	83·3				12	1	8·3	11	11	100			
	1 : 10^5	12	4	33·3	11	10	90·9	12	11	91·7				12	0	0	12	11	91·7	10	9	90
	1 : 10^6	12	1	8·3	8	0	0	12	7	58·3				12	0	0	12	11	91·7	12	0	0
	1 : 10^7							12	1	8·3										12	1	8·3
	1 : 10^8																			12	1	8·3
	1 : 10^9																			11	1	9·1
On Eye	N	10	0	0	10	7	70	12	10	83·3	6	6	100	11	10	90·9	11	11	100			
	1 : 10	12	0	0	12	3	25	11	9	81·8	10	0	0	9	9	100	10	10	100			
	1 : 10^2	11	1	9·1	10	2	20	12	5	41·7	7	1	14·3	11	7	63·6	11	11	100			
	1 : 10^3	11	0	0	10	0	0	12	1	8·3	6	0	0	11	6	54·5	10	5	50			
	1 : 10^4	12	0	0	11	0	0	12	2	16·7	7	0	0	7	0	0	12	1	8·3			

*Suspensions of organisms equivalent to Brown's tube No. 3.

any conclusions regarding the relative infectivity of the two variants. The exposure to infection by the eye route does, however, show that the 20th passage variant is the more infective of the two but it is still much less infective than any of the field strains or the four smooth repeatedly subcultivated laboratory strains.

The tests by the eye route on the 30th passage variant suggest that its infectivity is greater than that of the 20th passage variant. Conclusive evidence of the further enhancement of virulence by guinea-pig passage was furnished by exposing guinea-pigs to infection by the eye route and to intramuscular inoculation with suspensions of the 40th passage variant. This variant now behaved in a manner comparable to that of the field strains not only with regard to its infectivity for guinea-pigs as far as recovery of the organism from the animals' spleens was concerned but also with regard to the production of splenic enlargement.

The results obtained by the intramuscular inoculation of the less infective variants of strain 45 were very variable. The possibility of obtaining more consistent findings by inoculating guinea-pigs with undiluted suspension of the organisms and killing and examining groups of the animals at different periods after inoculation was investigated. The results of some of these experiments are given in Table VI and they show that by this method also there is considerable irregularity, but on the whole this method indicates that infection with the 20th passage variant persists for a more prolonged period than does infection with the 6th passage variant. This has been confirmed in immunisation experiments where groups of guinea-pigs were vaccinated with the 6th and 20th passage variants and later exposed to infection with a CO_2- sensitive strain

Table VI

Showing the Persistence of Infection in Guinea-pigs Inoculated Intramuscularly with 1 c.c. of a Suspension of Organisms equivalent to Brown's No. 3 Tube

Strain 45.	Days after Infection.														
	14			28			34			42			55		
	No. Inoculated.	No. Infected.	Per cent.	No. Inoculated.	No. Infected.	Per cent.	No. Inoculated.	No. Infected.	Per cent.	No. Inoculated.	No. Infected.	Per cent.	No. Inoculated.	No. Infected.	Per cent.
Original strain	10	0	0	8	0	0		—			—			—	
6th guinea-pig passage	10	3	30	19	6	31·6		—		10	3	30		—	
				10	2	20		—			—		9	2	22·2
13th guinea-pig passage		—		10	8	80		—		5	3	60		—	
				10	1	10		—			—			—	
20th guinea-pig passage	10	9	90	10	10	100		—		10	9	90	10	10	100
		—			—			—			—			—	
Original strain in 5 per cent. mucin ...							10	0	0	30	0	0			

Table VI—(*Continued*)

Strain 45.	Days after Infection.														
	59			84			91			94			101			119		
	No. Inoculated.	No. Infected.	Per cent.	No. Inoculated.	No. Infected.	Per cent.	No. Inoculated.	No. Infected.	Per cent.	No. Inoculated.	No. Infected.	Per cent.	No. Inoculated.	No. Infected.	Per cent.	No. Inoculated.	No. Infected.	Per cent.
Original strain		—			—			—			—			—			—	
6th guinea-pig passage		—			—		3	1	33·3		—		22	1	4·5		—	
		—		10	0	0		—		19	0	0		—			—	
13th guinea-pig passage ...		—			—			—			—			—			—	
	10	0	0	10	0	0		—		9	0	0		—			—	
20th guinea-pig passage ...		—			—		10	2	20		—			—		7	0	0
	10	3	30	10	2	20		—			—			—		10	0	0
Original strain in 5 per cent. mucin																		

of *Br. abortus*; when these animals were killed and their spleens examined culturally, the aerobic vaccine strain was isolated more frequently and at longer intervals after vaccination in the case of those animals inoculated with the 20th passage variant.

A comparative test on the toxicity for mice of the non-virulent strain 45 and the 6th, 20th and 40th passage variants was made and the results indicated that with serial passage there occurred a progressive increase of toxicity. This test confirmed those results already reported by Priestley and McEwen (1938) on the toxicity of strain 45 and the 6th and 20th passage variants.

Table VII

Showing the Toxicity for Mice of Strain 45 and of Variants of Strain 45 obtained by Guinea-pig Passage.

Strain.	Nos. of Organisms Inoculated in Thousand Millions.							
	16	8	4	2	1	0·5	0·25	0·125
45	5	1	1	0	0	0	0	0
45 6th passage variant	5	5	0	0	0	0	0	0
45 20th passage variant	5	5	2	0	0	0	0	0
45 30th passage variant	5	5	5	5	5	3	3	0
45 40th passage variant	—	—	5	5	5	3	4	1

Figures = Numbers dying out of 5 inoculated.

It has been shown that guinea-pigs vaccinated with the 6th passage variant possess a higher degree of resistance to infection than do animals vaccinated with the original strain 45 (McEwen and Roberts, 1936). Furthermore, it appears that the 20th passage variant is superior to the 6th passage variant as a living vaccine (McEwen and Priestley, 1939). Both these variants have been shown to be of low virulence for guinea-pigs and not to produce macroscopic lesions in the spleens of these animals. On this information these variants are comparable to certain strains of *Br. abortus* that have been used by Cotton (1932), Cotton and Buck (1933), Cotton, Buck and Smith (1933).

These workers in their studies on "non-virulent vaccines" accepted as their criteria of reduced virulence the inability of their strains to produce macroscopic lesions in inoculated guinea-pigs and their inability to recover the strains from the spleens from some of a limited number of animals used; they have not, however, reported critical tests on the infectivity of their strains for pregnant cattle. It was therefore of importance to ascertain the effect of inoculating cattle with those strains that did not cause macroscopic lesions in guinea-pigs and did not produce a permanent infection in these animals but nevertheless had been shown to possess varying degrees of infectivity for guinea-pigs. If it were shown that cattle might be inoculated with the 6th or 20th passage variants of strain 45 with safety, one or both of these variants might be found valuable for the safe immunisation of cattle in the field. The number of cattle available for experimental work was limited, therefore pregnant animals considered to be in a most susceptible state to *Br. abortus* infection were selected in order to make the tests as critical as possible.

It has already been shown that strain 45 which is eliminated in two to three weeks from the bodies of inoculated guinea-pigs may cause abortion when large doses are inoculated intravenously into pregnant cattle; nevertheless no infection of the udder was found to occur. The subcutaneous inoculation of a large dose of this strain does not however cause abortion nor does it set up a uterine or an udder infection and pregnant animals may be vaccinated with this strain with safety (McEwen, 1937).

Pregnant cattle were now inoculated with the 6th and 20th passage variants of strain 45.

Five pregnant heifers that had been under observation for five months prior to service and whose sera had consistently given negative reactions to the agglutination test were each inoculated subcutaneously with 8 c.c. of a suspension of the 6th passage variant equivalent in opacity to tube No. 6 on the Brown's Scale. The dose was in all respects similar to that of strain 45 which had failed to cause infection in any one of ten pregnant cattle (McEwen, 1937). All five of the animals inoculated with the 6th passage variant gave birth to vigorous calves although two of them were born prematurely and the two heifers that calved prematurely were found to be infected. The experiment which is summarised in Table VIII shows very definitely that the 6th passage variant was more infective for cattle than the original strain and that a strain even of such low infectivity for guinea-pigs as the 6th passage variant cannot be regarded as non-virulent for pregnant cattle.

Five pregnant heifers that had been isolated from their dams and all other adult animals from within a few days of birth and had been reared on dried milk were negative reactors to the agglutination test. When these animals were pregnant they were inoculated subcutaneously with 8 c.c. of a suspension of the 20th passage variant equivalent in opacity to tube 6 of the Brown's Scale. Two of the heifers aborted their calves, one calved prematurely and two calved normally. Four of the five heifers became infected. From these results which are summarised in Table IX (*see page* 104) it would appear that the 20th passage variant is of greater virulence for the pregnant bovine than the 6th passage variant.

Cattle inoculated subcutaneously with strain 45, which does not cause a permanent infection, have always shown serum agglutinins that reached their highest titre within one month of the inoculation, thereafter the titre declined. By contrast the serum agglutinin titres of the heifers inoculated with the 20th passage variant, which was a serologically rough type, are interesting. None of the sera of these animals caused any agglutination at dilutions of 1 : 10 or higher within 21 days of inoculation and 57 days after inoculation only one serum gave a reaction at a low dilution of 1 : 40. At later dates all of the sera showed some

TABLE VIII

A.—SUMMARISING THE RESULTS OBTAINED FROM THE INOCULATION OF PREGNANT HEIFERS WITH THE 6TH PASSAGE VARIANT FROM STRAIN 45.

Heifer No.	Amount of Culture equivalent to Brown's tube No. 6 Inoculated.	Days from		How Pregnancy Ended.	Results of Attempts at Isolation of *Br. abortus*.
		Service to Inoculation.	Inoculation to End of Pregnancy.		
17	8 c.c.	191	85	Slightly P	+
59	,,	163	102	P	+
27	,,	Not known	104	C (well-grown calf)	—
45	,,	177	117	C	—
56	,,	Not known	131	C (well-grown calf)	—

B.—SHOWING THE RESULTS OF MACROSCOPICAL AND BACTERIOLOGICAL EXAMINATIONS ON THE PLACENTAE AND OF BACTERIOLOGICAL EXAMINATIONS ON THE COLOSTRUM OF HEIFERS INOCULATED DURING PREGNANCY WITH THE 6TH PASSAGE VARIANT FROM STRAIN 45.

Heifer No.	Macroscopic Appearance.	Placenta.		Colostrum.	
		Smears.	Guinea-pigs.	Cultures.	Guinea-pigs.
17	Slight necrosis	+	+	+	—
59	(Uterine swabs)	+	+	—	—
27	Normal	—	—	—	—
45	Normal	—	—	—	—
56	(Uterine swabs)	—	—	—	—

C.—SHOWING THE AGGLUTINATION TITRES OF HEIFERS AT VARIOUS TIMES AFTER INOCULATION WITH THE 6TH PASSAGE VARIANT FROM STRAIN 45.

Heifer No.	Days after Inoculation.					
	18	27	56	77	129	143
17	640	320	320	640	160	80
59	1,280	320	80	2,560	640	640
27	2,560	640	640	320	80	80
45	40	80	20	40	20	10
56	160	160	40	20	20	Neg.

P=Calved prematurely. C=Calved normally.

reaction but with only one serum, that from animal No. 49, did the titre reach a level comparable to that which might have been expected had the animals been inoculated with a smooth non-virulent strain. The low titres shown by the remaining sera might suggest that the strain inoculated into the cattle retained its rough character but that some residual trace of smooth antigen stimulated smooth agglutinins in low titre. This explanation is not however tenable as the strain recovered from each of the animals was smooth, thermo-stable, and agglutinated to titre with smooth serum. It will be remembered that a reversion to the smooth type had also occurred with the continuance of the passage of the strain through guinea-pigs.

No explanation of the persistent low titre shown by three of the four animals that became infected is offered but attention is directed to the use that Meyer and Huddleson (1936) have made of a rough strain in the vaccination of cattle. These authors regard a subsequent serum agglutination reaction at a dilution of 1 : 200 in a vaccinated animal as contributory evidence showing that the animals had become infected and the absence of agglutination at that titre as evidence that the animals had not become infected. But the results now described show that a low agglutination titre in an animal inoculated with a rough variant is not necessarily evidence of the absence of infection with that variant or indeed of the absence of a subsequent infection with a smooth strain.

The most serious objections to the use of a live vaccine are that vaccination may perpetuate infection in the herd and actually cause some animals to become excretors of the vaccine strain in their milk. When the vaccine is prepared from a strain or from strains of normal virulence and adult cattle are inoculated these objections are valid and they would apply to vaccines of reduced virulence were it shown that they perpetuated infection or rendered vaccinated animals dangerous from the standpoint of human health. In order to obtain information which might furnish light upon these points the infectivity of some of the strains recovered from the heifers inoculated with the 6th and 20th passage variants was tested on guinea-pigs and the toxicity of some of the strains for mice was estimated. The results of these tests, which are summarised in Tables X and XI (*see pp.* 104 *and* 105 *respectively*), show that the 6th passage variant recovered by cultural means from the membranes and the milk of heifer No. 17 had not recovered the full infectivity normal to a field strain. A different result was, however, obtained with the strains cultivated from the milks of heifers inoculated with the 20th

TABLE IX

A.—SUMMARISING THE RESULTS OBTAINED FROM THE INOCULATION OF PREGNANT HEIFERS WITH THE 20TH PASSAGE VARIANT FROM STRAIN 45.

Heifer No.	Amount of Culture equivalent to Brown's Tube No. 6 Inoculated.	Days from		How Pregnancy Ended.	Results of Attempts at Isolation of *Br. abortus*.
		Service to Inoculation.	Inoculation to End of Pregnancy.		
46	8 c.c.	131	91	A	+
50	"	137	137	Slightly P	+
49	"	140	84	A	+
51	"	136	161	C	+
52	"	134	156	C	—

B.—SHOWING THE RESULTS OF MACROSCOPICAL AND BACTERIOLOGICAL EXAMINATIONS ON THE PLACENTAE AND OF BACTERIOLOGICAL EXAMINATIONS ON THE COLOSTRUM AND MILK OF HEIFERS INOCULATED DURING PREGNANCY WITH THE 20TH PASSAGE VARIANT FROM STRAIN 45.

Heifer No.	Placenta.			Foetus.					Colostrum.
	Macroscopic Appearance.	Smears.	Guinea-pigs.	Cultures.				Guinea-pigs.	Culture.
				Stomach.	Liver.	Kidney.	Spleen.		
46	Retained, probably necrotic	None	None	+	None	None	None	—	+
50	Slight necrosis	+	+						+
49	Retained, probably necrotic	+	None	+	+	+	+	+	+
51	Normal	—	—						+
52	"	—	—						—

C.—SHOWING THE AGGLUTINATION TITRES OF HEIFERS AT VARIOUS TIMES AFTER INOCULATION WITH THE 20TH PASSAGE VARIANT FROM STRAIN 45.

Heifer No.	Days after Inoculation.											
	21	36	57	75	88	95	96	105	126	156	162	166
46	—		40	80		80						80
50	—		—	—					40			80
49		—	—	10	80		640					
51		—	—	20				10			40	
52		—	—	40				10		10		

A=Aborted. P=Calved prematurely. C=Calved normally.

TABLE X

SHOWING THE INFECTIVITY OF PASSAGED STRAINS OF *Br. abortus* RECOVERED FROM INOCULATED HEIFERS.

Method of Infection.	Dilutions of Suspensions of Organisms equivalent to Brown's tube No. 3.	Strain 45 (6) from Membranes of Heifer 17.			Strain 45 (6) from Milk of Heifer 17.			Strain 45 (20) from Milk of Heifer 51.					
		No. Inoculated.	No. Infected.	Per cent.	No. Inoculated.	No. Infected.	Per cent.	No. Inoculated.	No. Infected.	Per cent.	No. Inoculated.	No. Infected.	Per cent.
Intra-muscular	N	12	1	8·3				11	11	100			
	1 : 10	12	7	58·3				12	12	100			
	1 : 10^2	12	4	33·3				12	12	100			
	1 : 10^3	12	5	41·7				11	11	100	12	12	100
	1 : 10^4	12	1	8·3				12	12	100	11	11	100
	1 : 10^5	12	1	8·3				11	11	100	12	12	100
	1 : 10^6	12	0	0				10	10	100	11	11	100
	1 : 10^7	12	0	0				8	6	75	12	11	91·7
	1 : 10^8				9	0	0				11	7	63·6
	1 : 10^9				9	0	0				11	7	63·6
On Eye	N												
	1 : 10										11	11	100
	1 : 10^2										12	12	100
	1 : 10^3										12	10	83·3
	1 : 10^4										12	6	50
											12	0	0

Table XI

Showing the Toxicity for Mice of the 20th Passage Variant of Strain 45 after Recovery from the Udders of Three Inoculated Heifers.

Variant from Milk.	No. of Organisms Inoculated in Thousand Millions,						
	8	4	2	1	0·5	0·25	0·125
Heifer 51	5	3	5	1	0	0	0
Heifer 46		3	3	1	0	0	0
Heifer 50		5	5	2	2	0	0

Figures = numbers dying out of 5 inoculated.

passage variant. One of these strains was found to be as infective for guinea-pigs as were field strains and three of the strains showed a toxicity for mice comparable to that of field strains. All of the strains examined therefore showed an exhaltation of virulence and it may be concluded that any method of vaccination even with a vaccine of reduced virulence is objectionable should the vaccine be capable of causing an udder infection.

Additional evidence of the recovery of virulence by the 20th passage variant during its sojourn in the body of the cow is furnished by information obtained from cattle. Two months after pregnancy terminated the heifers numbers 49, 50, 51 and 52 were placed among a group of cows some of which had been vaccinated with strain 45. Those that had not been vaccinated were all consistent non-reactors to the agglutination test and were regarded as free from infection. Six months after the first of the heifers was placed in contact with the group of cows one of the non-vaccinated cows showed a positive reaction to the agglutination test and two months later she aborted. An aerobic strain of *Br. abortus* was recovered from the foetus and from her milk. The milks from the cows vaccinated with strain 45 were repeatedly examined for *Br. abortus* but that organism was never found. It would therefore appear that the non-vaccinated animal became infected with an aerobic strain of *Br. abortus* from one of the heifers inoculated with the 20th passage variant. Furthermore, it is probable that the infection had been disseminated from the udder as two months had elapsed since parturition before contact was made. This infectivity of the passaged strain for cattle corroborates the evidence obtained from guinea-pigs and mice and shows that the 20th passage variant had become fully virulent.

That the 20th passage variant was originally of reduced virulence for cattle is clear from a comparison of the results of the subcutaneous inoculation of this variant into pregnant heifers with those that were obtained by exposing pregnant heifers to infection with a field strain (strain 544) by the eye route. In the latter case a small dose of strain 544 applied to the surface of the eye caused eight out of ten pregnant animals to abort and one to calve prematurely (McEwen, Priestley and Paterson, 1939) whereas a dose of the 20th passage variant 16,000 times greater and inoculated subcutaneously caused two out of five animals to abort and one to calve a few days prematurely. The experiments that have been described show that the virulence of strain 45 had been raised by the passage of the strain through guinea-pigs, and by the combined passage of the strain through guinea-pigs and cattle. By both methods the virulence had been raised to, but not beyond, that of field strains of the organism. Three years after these experiments had started strain 45 was again passaged through a series of guinea-pigs to see whether the exaltation of virulence could be repeated. At the same time comparable passage experiments were made on rabbits and on mice. In each case the toxicity of the passaged variants was tested by the intraperitoneal inoculation of mice. The strain after passage through a series of ten guinea-pigs and ten rabbits respectively was found to be definitely more toxic than the original strain but the strain after passage through a series of ten mice had not altered in its toxicity for these animals. In these experiments the work was not carried further but the enhanced toxicity of the strain after guinea-pig and also after rabbit passage was accepted as proof of increased virulence and of evidence of the facility with which virulence may be resuscitated by suitable animal passage.

Strain " Russell " that had been isolated seven years previously and had been subcultivated 509 times and was still fully virulent for guinea-pigs was passaged through a series of ten guinea-pigs and also through a series of ten rabbits. Each of the passaged variants was then tested for toxicity by the intraperitoneal inoculation of mice. Animal passage had not however increased the toxicity of the strain which in the unpassaged state was comparable to that of field strains. This experiment together with those performed on field strains and on the passaged variants of strain 45 suggests that there is a limit to the virulence of *Br. abortus* which is not surpassed but which, under suitable conditions, is regained by strains that have lost much of their original virulence through propagation outside the animal body. Furthermore the experiments suggest that field strains of *Br. abortus* have a common level of virulence.

It has been shown that strain 45 may be used with safety as a live vaccine for the inoculation of pregnant cattle, its virulence being so reduced that no infection can be demonstrated in the animals after calving. Strains that are but slightly more virulent for guinea-pigs than strain 45 cannot, however, be used with safety as live vaccine for pregnant cattle. Nevertheless, this does nor preclude the safety of strains of reduced virulence under certain circumstances, and as an effective resistance to infection may to some extent be dependent upon the use of vaccines of some degree of virulence it remains to determine those conditions which must be fulfilled before pregnant animals or adult cattle can be safely vaccinated with strains of reduced virulence.

Summary

Experiments on the infectivity of strains of *Br. abortus* for guinea-pigs and cattle are described, together with the results of tests on their toxicity for mice.

A high infectivity and a high degree of toxicity are regarded as evidence of virulence; conversely, low infectivity and low toxicity are accepted as evidence of low virulence.

Field strains of *Br. abortus* have a common level of virulence that may be shared by strains kept in the laboratory for several years and repeatedly subcultivated. A marked reduction of virulence for guinea-pigs and mice is accompanied by a great reduction in virulence for pregnant cattle. Nevertheless, pregnant cattle inoculated subcutaneously with strains of very low infectivity for guinea-pigs and of low toxicity for mice may become infected in the uterus and in the udder and the strains on recovery from these animals may be fully virulent.

A strain of *Br. abortus* may be so reduced in virulence that it is unable to cause infection of the uterus or of the udder when inoculated subcutaneously into pregnant cattle. Such a strain may nevertheless become enhanced in virulence by suitable animal passage until it is as virulent as field strains.

The repeated subcultivation on laboratory media may have no detrimental effect on virulence.

With existing knowledge regarding immunity to *Br. abortus* infection the immediate problem is that of finding ways and means of vaccinating cattle with living strains of *Br. abortus* of as high a degree of virulence as possible without thereby causing an infection of either the uterus or the udder.

References

Cotton, W. E. (1932). *J. Agric. Res.* **45.** 705.
———, and Buck, J. M. (1933). *Ibid.* **46.** 315.
———, ———, and Smith, H. E. (1933). *Ibid.* **46.** 291.
McEwen, A. D. (1937). *Vet. Rec.* **49.** 1585.
———, and Roberts, R. S. (1936). *J. comp. Path.* **49.** 97.
———, Priestley, F. W., and Paterson, J. D. (1939). *Ibid.* **52.** 116.
Meyer, D. B., and Huddleson, I. F. (1936). Bull. No. 153, Mich. Agric. Expt. Stn.
Priestley, F. W., and McEwen, A. D. (1938). *J. comp. Path.* **51.** 282.

. . . . .

This work was financed by a grant approved by the Agricultural Research Council.

SHIRE HORSE SOCIETY DEMAND FOR RE-INSTATEMENT OF HORSE-BREEDING GRANTS

The withdrawal of the heavy horse grants was considered by the Council of the Shire Horse Society at a recent meeting in London, when it was reported that a large number of letters had been received from heavy horse hiring societies indicating that if the grants were not reinstated an enormous decline in heavy horse breeding would inevitably follow, while many letters from War Agricultural Executive committees deplored the Minister's action in withholding the grants at a time when the horse is so vital.

The Council unanimously agreed to press for a reinstatement of the grants, and hopes are still entertained for success.

To obviate regular meetings of the Council a special committee was set up to manage the Society's affairs. The members are Mr. C. Barker, Mr. J. Morris Belcher, Mr. W. J. Cumber, Mr. Thomas Forshaw, Sir Walter Gilbey, Bart., Mr. A. Thomas Lloyd and Col. A. F. Nicholson.

THE VETERINARY RECORD

February 10th, 1940.

THE NEW EDITORSHIP OF *THE VETERINARY JOURNAL*

IN VIEW of the announcement on the cover of the current issue of our contemporary that Professor T. Dalling has been appointed Editor and Professor J. McCunn Assistant Editor, we hasten to bid them success in their task; and this for at least three good reasons which, we feel sure, will come at once to the minds of all our readers.

First, *The Veterinary Journal* is a periodical which has played a distinguished and honourable part in our professional history. It would be well for us now briefly to recall that part, both as a token of our gratitude and as an earnest of our desire for the continuance of the journal as an organ of lofty endeavour. Secondly, during the period of national stress that lies ahead of us, when from past experience many may fear that many beneficent enterprises in the domain of professional and scientific advancement are doomed to perish, it is our bounden duty to foster by our encouragement every trend which we foresee as likely to ward off setbacks in our corporate development. Such a trend we conceive to be the placing of a contemporary veterinary periodical under strong and able editorship. Far from regarding any possible rivalry between our distinguished contemporary and our own journal as competitive in a deleterious sense, we conceive no greater incentive to high endeavour on our own part than the prosecution of what we feel sure, from what we know of the men themselves, to be the aims of the new editors in discharging their task to the highest degree of success. The well-known good relations of the two great British weekly medical journals here bear us out. Furthermore, ample scope remains for the healthy existence of the two journals—our own and *The Veterinary Journal*—side by side; they have evolved and are still more likely in future to evolve along somewhat divergent lines, to meet fairly obviously different needs in veterinary journalism. Thirdly, both Professor Dalling and Professor McCunn have earned our gratitude for their assiduity in promoting the interests of the N.V.M.A. With the heavy and multifarious duties already shouldered by him within their knowledge, it must have come as a surprise to some readers that Professor Dalling has assumed the additional incubus of editing a monthly veterinary periodical. The proprietors of the journal had doubtless in mind the aphorism that if one wishes to get a job done with certainty it is best to entrust it to a busy man. Professor Dalling on the scientific research side and Professor McCunn on the clinical and practical side may be looked upon as eminently in touch with all interests within the profession. Both are at heart veterinarians, and aside from their recognised competency, they possess to an unrivalled degree those virtues

needed to enlist the enthusiasm of contributors—magnanimity of mind and proved ability to captivate the affections of the general mass of the profession.

The Veterinary Journal or *Annals of Comparative Pathology*, as it was first called, came into existence in 1875, at a rather critical stage in the history of the veterinary profession, for in the hands of its remarkable founder, Dr. George Fleming, it was soon destined to play a conspicuous rôle in evoking the widespread professional interest that was to enable him to gratify his foremost ambition—the attainment of legal status by the veterinary profession—which was achieved by the passing of the Veterinary Surgeons Act, 1881. The story of that achievement deserves to be retold in rather more space than we are entitled to devote to it in this leading article. But the main facts were set out in the Jubilee Number of *The Veterinary Record* (July 16th, 1938). Fleming abandoned the editorship of *The Veterinary Journal* in 1894. The editorship has since been entrusted to a succession of men held in high esteem within the veterinary profession—Professor W. Williams, 1895; Professor W. O. Williams, 1896; Colonel Joshua Nunn, 1905; Professor G. H. Wooldridge and Professor F. T. G. (later Sir Frederick) Hobday (joint editorship, 1906-1914); subsequently, from 1917 until Sir Frederick's death in 1939, the latter was aided by G. Mayall: in addition, a board of assistants has been formed. Between 1906 and 1910 under the sub-title *An Anglo-American Review of Veterinary Science* an attempt was made to widen the geographical scope of the journal by enlisting the collaboration of editors on both sides of the Atlantic.

From being an all-embracing professional and scientific journal under Fleming, *The Veterinary Journal* has tended to become under the above successive editors more and more a repository for original articles, both clinical and scientific. We shall not mean it as a disparagement of the efforts of the successive editors after Fleming, and particularly of the dynamic and affable personality of the lately deceased editor, Sir Frederick Hobday, if we reveal our view that a journal which has evolved to serve mainly these ends demands ruthless scrutiny of all its contents by an editor possessed of what is probably not a very common combination of qualities, namely, a proved scientific and analytical turn of mind, together with a flair for good plain literary expression. In the appointment of Professor Dalling as Editor we have the satisfaction of appreciating that the proprietors must have fully anticipated our viewpoint. It is our hope that the proprietors of *The Veterinary Journal* will admit no other considerations in strengthening the hands of their new editors. Allowed to prosecute their task fearlessly, these editors may be trusted to see to it that nothing lacks in the standard of article accepted for publication and that our veterinary literature shall bear no taint of reproach in the eyes of the most discriminating readers.

CLINICAL COMMUNICATION

THE TREATMENT OF BR. ABORTUS-INFECTED CATTLE WITH "ABORTULIN"

A. D. McEWEN,
Wye,
and
G. E. OXSPRING,
Ashford

We have not seen reports showing reliable experimental or bacteriological evidence of the successful sterilisation of the tissues of bovine animals infected with *Br. abortus* by treatment with "abortulin." We have, however, frequently been asked by veterinary surgeons and farmers our opinion of this treatment.

In order to obtain some definite evidence on the effect of treating *Br. abortus*-infected animals with "abortulin," two cows that were known excretors of *Br. abortus* in their milk were inoculated intravenously with "abortulin" which was supplied to one of us (G.E.O.) by the distributors of that preparation. The inoculations were carried out precisely in the manner indicated in a pamphlet issued by Abortulin Limited, and in each case the administration was successful, no leakage of the "abortulin" from the intravenous inoculation into the subcutaneous tissues or elsewhere being observed.

The two cows remained excretors of *Br. abortus* in their milk after treatment.

Both animals belonged to the same commercial dairy herd where *Br. abortus* infection had been diagnosed.

The method of examining the milk for *Br. abortus* was to inoculate gravity cream from quarter milk samples on to each of two large slopes of malachite green, thionin blue agar (Stockmeyer, 1933) and to incubate these for five or six days in an atmosphere containing 10 per cent. CO_2. The characteristic colonies of *Br. abortus* were then identified and suitably stained smears of representative colonies were examined microscopically. On some occasions subcultures were prepared and suspensions of the organisms from these were agglutinated by known positive *Br. abortus* serum but not by known negative serum.

The two cows were numbered 54 and 60. The former showed a relatively light infection of all four quarters; the latter had a relatively heavy infection of the right hind quarter only.

The two cows were treated with "abortulin" on October 25th, 1939.

Cultural examinations had been made on the milk from both animals on nine occasions between June 1st, 1939, and the date on which treatment was given. On only two of these occasions was *Br. abortus* not recovered from the cream of cow No. 54. Although all quarters of her udder were infected, *Br. abortus* was not recovered from all quarters at every examination where positive results were obtained. The total number of colonies recovered at each positive examination before treatment varied from three to twenty-one. At the last two examinations before treatment with "abortulin," seven colonies were

isolated on October 9th and three colonies on September 21st.

Br. abortus was cultivated from cream from the right hind quarter of cow 60 at all of the examinations made before treatment and the number of colonies obtained on each occasion ranged from 45 to 1,500.

After treatment the cream from cow 54 was cultivated on October 31st, November 6th and November 14th, 1939, and on each occasion *Br. abortus* was recovered from it, the total number of colonies being respectively 5, 35 and 10. Thereafter the cow was dried off and although further attempts to cultivate the organism from the udder secretions were made, these were unsuccessful because of the extensive contamination of the cultures caused by the difficulty now met with in drawing material aseptically from the udder.

Br. abortus was isolated after treatment from the cream from the right hind quarter of cow 60 on each of the nine occasions when the cream was cultivated, at approximately weekly intervals, commencing on October 31st, 1939, and continuing until January 2nd, 1940. The number of colonies cultivated on each of these occasions varied between 50 and more than 1,000.

In order to obtain further confirmatory evidence, the mixed gravity cream from all four quarters of each cow, collected on November 3rd, 1939, was inoculated into guinea-pigs and the animals were killed and examined on January 18th, 1940. The macroscopic appearances of their spleens were noted; their blood sera were tested for agglutinins for *Br. abortus*, and material from their spleens was cultivated for that organism. The results of the examinations on the guinea-pigs are shown in Table I.

Table I.

Showing the Results of Inoculating Guinea-pigs with Cream from Two Cows Nine Days after the Cows had been Treated with "Abortulin."

Cow 54.

No. of Guinea-pig.	Macroscopic Appearance of Spleen.	Spleen Cultures.	Titre of Serum.
1	Enlarged and slightly nodular	+	1 : 640
2	Very enlarged and slightly nodular	+	> 1 : 640
3	Enlarged and slightly nodular	+	1 : 320
4	Enlarged and slightly nodular	+	1 : 160

Cow 60.

No. of Guinea-pig.	Macroscopic Appearance of Spleen.	Spleen Cultures.	Titre of Serum.
1	Enlarged and slightly nodular	+	> 1 : 640
2	Enlarged and slightly nodular	+	> 1 : 640
3	Enlarged and slightly nodular	+	> 1 : 640
4	Very enlarged and slightly nodular	+	> 1 : 640

Table I shows that all the guinea-pigs were infected with *Br. abortus* and this proves that the udder tissues of the two cows treated with "abortulin" were not sterile but still infected with *Br. abortus* nine days after treatment.

The combined results of the direct cultural examinations of the cream and the inoculation of the cream into guinea-pigs from the two cows treated with "abortulin" not only prove that the animals were infected after treatment but exclude the possibility of sterilisation having been accomplished and of a reinfection accounting for the appearance of *Br. abortus* in the milk some time after treatment.

ABSTRACTS

[THE EFFECT OF THE SEROBORTAN VACCINE METHOD OF OPPERMANN AND CURTIUS AND THE "AO$_3$" METHOD OF DR. BERTRAM-SOEST ON BRUCELLA INFECTION OF CATTLE. Zeller, H., and Henninger, R. (1939.) *Z. Infektkr. Haust.* **54**. 265-280.]

Curtius and also Oppermann have claimed that if cattle infected with *Br. abortus* are given Serobortan and simultaneously injected with a dead abortion vaccine the positive blood titres disappear and that if the cattle are excreting *Br. abortus* in their milk this excretion ceases in a considerable proportion of cases. Serobortan is a product of normal horse serum, to which are added certain mineral substances.

In view of the wide claim made in Germany for this method, Zeller and Henninger were asked to carry out an official test. For the first experiment 13 cows, which had positive blood titres and were excreting *Br. abortus* in their milk, were obtained. Three were left as controls and ten treated, five receiving simultaneously three doses of Serobortan (20, 30 and 50 c.c. respectively at intervals of 14 days) and simultaneously three doses of "D vaccine" (*Br. abortus*), five others the same doses of Serobortan and simultaneously two doses of "Yatren abortus vaccine." The blood titres and excretions of *Br. abortus* were followed for six months but without any significant evidence of cure.

A second experiment made on six more infected animals which received six doses of Serobortan, 30 to 80 c.c. at weekly intervals intravenously, and three doses of D vaccine or Yatren vaccine also failed to show any evidence of cure.

In the second part of the article, a report is made of an official test of the claims of Dr. Bertram-Soest that his "AO$_3$" preparation which contains camphor and a sodium salt of O. iodo-phenol would cure *Br. abortus* infection of cows. This was carried out on five cows but again no evidence of cure could be obtained.

It must unfortunately be concluded, therefore, that neither of these methods is likely to be of value in dealing with contagious abortion of cattle.

A. W. S.

* * * * *

[METABOLISED VITAMIN D MILK. Editorial.—*Amer. J. Pub. Hlth.* **28**. 233.]

The Council on Foods of the American Medical Association have granted a seal of acceptance to licensed dairies producing a metabolised vitamin D milk. Irradiated dried yeast is fed to the cows, and is sold only for herds producing milk of the above specification. Before a licence is issued the dairyman must produce a certificate from a control body that he

is responsible, in good standing, and qualified to produce milk under the proper conditions.

The vitamin D content of the milk produced is not less than 400 units per quart. A special bonus is paid to recompense the producer for the extra labour entailed.

D. D. O.

* * * * *

[FAILURE OF SULPHANILAMIDE TO INACTIVATE PRE-FORMED HAEMOTOXINS, DIPHTHERIC TOXIN, OR TETANAL TOXIN. Osgood, E. E., and Powell, H. M. (1939.) *Proc. Soc. Exp. Biol. Med. N.Y.* **39**. 37-40. (2 tabs. 1 ref.).]

Since experiments with sulphanilamide on beta haemolytic streptococci in human marrow cultures indicated that the drug interfered with the production of toxins, attempts were made to inactivate haemotoxins from beta haemolytic streptococci, *Cl. tetani*, *Cl. oedematis-maligni*, *Staph. aureus*, and *B. perfringens* by various concentrations of sulphanilamide, but no significant results were obtained.

A similar lack of success attended attempts to cure guinea-pigs injected with diphtheric or tetanal toxins by subsequent treatment with sulphanilamide.

D. D. O.

REPORT

[NATIONAL INSTITUTE FOR RESEARCH IN DAIRYING: REPORT FOR 1938.]

By their very nature annual reports are apt to be dull and lacking in interest for any but those particularly associated with such activity as is recorded therein. The general reader may suspect padding and regret the absence of conciseness whilst *per contrà* the specialist laments the lack of circumstantial evidence. Hence their sphere of readers is a very limited one. The Annual Report of the N.I.R.D. for 1938, however, though primarily written for the former class offers much of interest for the latter and by virtue of its wide scope should command considerable popularity.

The greater part of this well-produced publication deals with the work carried out by the three main departments of the Institute, namely, Chemistry, Physiology and Biochemistry, and Bacteriology, and the variety of subjects investigated might almost be said to be alarming. Nutrition in its relationship to milk and milk products naturally takes a prominent part and the chemical problems dealt with, associated with these products, are numerous. Certain endocrine and pathological aspects of milk production are also under investigation.

On the Institute Farm itself practical experiments are always under way. Feeding experiments include an enquiry into the protein requirements of the dairy cow, the use of urea as a protein substitute and the value of artificially dried grass, sprouted maize, and different types of silage as food for milch cows. By the use of modern laboratory technique combined with strict methods of management, both mastitis and contagious abortion have been brought under control.

It is with interest we note that the Imperial Bureau of Dairying has now been established at the Institute under the direction of Professor D. Kay. The much-needed new buildings, so long awaited, have at last been obtained and the Department of Physiology and Biochemistry has now moved into its new quarters. Facilities for testing out new dairying machinery are now available.

ROYAL COLLEGE OF VETERINARY SURGEONS

Quarterly Meeting of Council

A quarterly meeting of Council of the Royal College of Veterinary Surgeons was held at 10, Red Lion Square, London, W.C.1, on Thursday, January 11th, 1940, at 12 noon.

Professor G. H. Wooldridge, President, occupied the Chair and there were also present: Professors J. F. Craig, T. Dalling, Messrs. H. W. Dawes, G. W. Dunkin, J. Holroyd, G. H. Livesey, G. P. Male, Colonel W. S. Mulvey, Colonel Sir Arthur Olver, Mr. J. W. Procter, Dr. J. T. Share-Jones, Lieut.-Colonel P. J. Simpson, Mr. H. W. Steele-Bodger, Mr. W. K. Townson, Colonel G. K. Walker, Dr. A. W. Whitehouse, Mr. T. Wilson, Dr. W. R. Wooldridge and Professor J. G. Wright.

Letters of apology for absence were received from: Professor J. B. Buxton, Messrs. J. Dodd, P. F. Dolan, A. A. Donnelly, G. H. Locke, J. W. McIntosh, A. MacKenzie, A. B. Mattinson, T. M. Mitchell, W. Nairn, Professor J. J. O'Connor, Messrs. Arnold Spicer and J. F. D. Tutt.

Welcome to New Members.—The President offered a cordial welcome to Mr. H. W. Steele-Bodger, a new member of the Council, and also to Dr. Whitehouse on his return to the Council.

The minutes of the previous meeting were taken as read and signed as correct.

Obituary.—The Registrar read the list of Members whose death had been recorded since the last meeting of the Council. The Council stood while the list was being read.

Correspondence

(1) The Secretary reported the receipt from the Royal (Dick) College Centenary Fellowship of a request for the nomination of a Trustee of the Fellowship in place of the late Major Archibald Baird. This had been submitted to the members of the Executive Committee with the name of Mr. McIntosh, whose name had been suggested on behalf of the Trustees, and the President and Executive Committee agreed to nominate Mr. J. W. McIntosh.

On the motion of Mr. Dunkin, seconded by Mr. Male, the nomination was confirmed.

(2) From the Executors of the late Sir Frederick Hobday; announcing that he had left the College a legacy of £100 on the following terms: "Upon trust to invest the same and to stand possessed of the Income thereof upon Trust to accumulate such Income until there is a sufficient sum in the discretion of the Trustees or Committee of the said College to pay as a Student's prize in competition open to all the Veterinary Training Colleges in Great Britain and Northern Ireland, the travelling fare of one third year student to assist such student to visit either a French, German, Dutch, Danish or Italian Veterinary School." The authority of the Council was now required for the acceptance of the trust on the terms set out in the letter.

The President: I think it is a legacy that can be received, and the trust can be accepted. I presume we shall have to invest the sum until the funds accumulate sufficiently to warrant making an award.

Professor Craig: I do not know how the Trust can be implemented. We are obviously grateful for the sum which has been given to us, but I do not know how we can distribute the money from the fund in order to fulfil the objects for which the money was given. That is the difficulty which I foresee in connection with this money. It might be well to add the money, if that were possible, to other funds having the same object.

The President: I do not think that the change suggested would simplify the problem. The interest likely to be produced by this money will be comparatively small, and it will not be possible to make an award every year; the award would have to be made every so often, when the funds are thought to be sufficient for the purpose.

Mr. Male: I propose that the matter be referred to the Finance and General Purposes Committee. They can discuss all these points. I do not know whether the Executors have been thanked for this very generous donation?

The Secretary: Yes, that has been done. I also wrote and asked whether the Executors had any views themselves as to the best way of investing the money and distributing the prize. They replied that they were satisfied to leave the investment of the £100 and the award of the prize to the Council, to deal with as they think fit.

The motion to refer the matter to the Finance and General Purposes Committee was duly seconded and carried.

Admissions to Membership.—The Secretary read the list of new Members admitted since the previous Quarterly Meeting, on the results of the examinations held by the College in the month of December. The number admitted was 70. At the July examination there were 95, making a total of 165 new graduates for the year.

Report of the War Emergency Executive Committee

The Secretary read the following report of the War Emergency Executive Committee held on October 16th, 1939.

Special Examination Arrangements

(*a*) *Animal Management.*—The Secretary reported that he had made arrangements for holding the Animal Management Examination at the five centres beginning in the week commencing November 6th.

(*b*) *December Examinations.*—The Secretary reported that he had made arrangements for holding the written examination on December 4th and 5th at the five centres, and that the orals and practicals would be arranged at Dublin, Glasgow, Edinburgh, Liverpool and at another centre for the London students.

Professor Buxton explained that owing to the outbreak of war and Government restrictions it had been necessary to arrange for the transfer of the Royal Veterinary College to Reading, but that the proposed transfer had been delayed on account of new and unforeseen circumstances until January 1st, 1940. It was, however, probable that special arrangements could be made at Reading for the oral and practical examinations to be held there in December. Professor Buxton asked that in view of the impossibility of holding classes at the Royal Veterinary College during the current term a special examination might be held at Reading in March, 1940, for those students who would normally be sitting at the December examination. The number of these candidates would probably be about 62.

It was resolved: (*i*) "That arrangements be made for holding an examination for referred and rejected candidates at Reading if possible in the month of December; (*ii*) "That an examination be arranged in the month of March, 1940, for students of the Royal Veterinary College in the Second, Third, Fourth and Fifth Years who would normally have presented themselves in December; (*iii*) "That if the circumstances at the time make it impossible for an Examiner to act, the President be authorised, if the appointment of a substitute Examiner is found to be impracticable, to arrange for the examination in any subject to be carried out with one External Examiner in addition to the Internal Examiner."

Protection of College Building

An estimate was received for the boarding up inside and outside of the stained glass windows in the Council Room, at a cost of £22.

The estimate was accepted.

Portraits.—It was resolved: (*a*) "That the portraits in the College building be removed from their frames and packed in suitable cases, the frames to remain at 10, Red Lion Square, and the pictures to be transferred to a place of safety"; (*b*) "That the portraits be insured in transit and while they remain away from Red Lion Square."

Transfer of Offices to Wembley.—It was resolved: (*a*) "That the office staff and the remainder of the essential equipment and files be removed as soon as possible to 30, Park Lane, Wembley"; (*b*) "That provision be made for extra storage and office accommodation, and that the estimate of Messrs. Wardley & Son for the necessary materials and labour at a cost of £33 5s. 0d. be accepted."

Animal Welfare Societies.—Mr. Livesey reported that he had been asked to serve on the Organising Committee of the N.V.M.A. for the purpose of assisting in the negotiations which were in progress between the N.V.M.A. and the Animal Welfare Societies.

It was resolved: "That as Mr. Livesey is Chairman of the P.D.S.A. Sub-Committee, it would be inexpedient for him to accept nomination to serve on the Organising Committee of the N.V.M.A. for the purpose mentioned."

Mr. Dunkin: May I ask whether or not there was a resolution with regard to the last paragraph?

The President: Yes, it was decided at the meeting of the Emergency Committee, and there was in fact a resolution on it.

Mr. Dunkin: I move approval of the action of the War Emergency Executive Committee, as indicated in its report.

Mr. Male seconded the motion, which was carried.

Financial Statement for the Quarter

The Secretary: It was not thought necessary to call a meeting of the Finance Committee, because the matters were of a routine character. The Quarterly Statement has been passed by the Treasurer and circulated to the members of the Council. It will be noted that there is a balance in hand to carry forward of £3,743, but liabilities amount to £555, and the whole cost of the December examinations has to be paid. It is usual to approve the Statement and to authorise the Treasurer to pay the liabilities, together with items of current expenditure.

The President moved from the Chair that the Financial Statement be received. The motion was carried.

After inquiring whether there were any comments upon it, he proposed from the Chair, in the absence of the Treasurer, that it be adopted, and that the Treasurer be ordered to make the customary payments.

The motion was carried.

Safety of Portraits

The Secretary explained that he had not been able to provide a suitable safe place in the country for the reception of the pictures. They had been removed from the frames and were in packing cases in the hall, in case it should be decided to send them away.

Mr. Livesey: I move that the suggestion of the Secretary be accepted, and that the pictures remain on the premises, the insurance to be maintained.

Colonel Walker seconded the motion, which was carried.

An application from a tenant for a reduction of rent was referred to the Executive Committee, together with the question of the investment of the Hobday Bequest.

Voluntary Contribution.—The Secretary reported that the late Mr. William Willis expressed during his life his desire to contribute £1 1s. 0d. to the College funds in respect of each year since his qualification. He had paid a total amount of £24 3s. 0d. before he died. His daughter, Mrs. Perry, of Tadworth, has since sent a cheque for £13 13s. 0d. in memory of her father. The total amount thus voluntarily subscribed is £37 16s. 0d.

It was resolved, "That the thanks of the Council be conveyed to Mrs. Perry for the donation of £13 13s. 0d. in memory of her father."

Investments.—The Treasurer reported that the following investments had been made since the previous meeting: £1,000 4 per cent. Consols and £500 3½ per cent. War Loan.

Registration Committee

The Secretary submitted two reports—(*a*) from the Edinburgh City Police, (*b*) from the Selkirk Constabulary—in reference to the conduct of a certain member.

Letters from the member concerned having been read the Council went into Committee.

On resuming the sitting of Council, the report of the Committee was approved.

Application for Restoration.—An application was received from a former Member whose name had been removed from the Register by order of the Council for the restoration of his name. The Secretary reported the receipt of evidence showing that the applicant had continued to describe himself as M.R.C.V.S. in spite of the decision of the Council. The Secretary had written requesting that the improper use of the title should be discontinued, but had received no reply.

It was resolved "That the consideration of the application be not proceeded with."

P.D.S.A. Sub-Committee.—Mr. Livesey reported the recommendation of the P.D.S.A. Sub-Committee that a Joint Committee be formed of representatives of the Royal College of Veterinary Surgeons and the N.V.M.A. to consider the proposals for collaboration of the profession with the work of the P.D.S.A. and other animal charities.

It was resolved "That the recommendation be approved and that the members of the P.D.S.A. Sub-Committee be the representatives of the College on the Joint Committee."

Examination Committee

The Secretary read the following report of the Meeting of the Examination Committee held on January 11th.

The minutes of the previous meeting, having been printed and circulated, were taken as read and signed as correct.

Report on Animal Management Examination.—The report of the Examiners on the Animal Management Examination held in November, 1939, was read and approved.

Reports on December Examinations

The reports of the Secretary, Chairmen of the Court of Examiners and Delegates on the Examinations held in December were submitted and approved. These reports embodied the following information:—

Court of Examiners

A few days before the Written Examination, the Secretary learned of the death of Dr. G. D. Lander, who had been Examiner in Chemistry and Physics since 1923. The President appointed Dr. J. Knox, D.Sc., of the Glasgow University as External Examiner in this subject.

The following External Examiners were unable to act for the reasons stated:—

Anatomy: Colonel H. C. Bowes—illness.
Surgery: Major A. A. Pryer—on military service.
Medicine: Major W. H. Wortley—on military service.

The following Examiners were appointed by the President to take the place of the above:—

Anatomy: Dr. J. S. A. Spreull.
Surgery: Major G. E. Oxspring.
Medicine: Mr. Donald Campbell.

As authorised by the Council at the September meeting (Minutes, para. 6 (xi) (*b*) and (xii), the President appointed Mr. F. Blakemore, M.R.C.V.S., D.V.S.M., as External Examiner in Pathology, and Mr. S. A. Evans, M.R.C.V.S., as External Examiner in Parasitology.

Internal Examiners

Animal Management, Edinburgh.—The President approved the emergency appointment of Mr. J. W. Burgess as Internal Examiner in Animal Management for one of the days of the examination in Edinburgh in November.

The President has approved the appointment of the following Internal Examiners for the December examinations:—

Liverpool, Biology: S. T. Burfield, M.A., M.Sc.
Liverpool, Parasitology: Prof. D. B. Blacklock, M.D., D.P.H., D.T.M.
Edinburgh, Biology: T. Warwick, B.Sc.

Oral and Practical Examinations

The oral and practical examinations of the students of the Royal Veterinary College were held in different places, as follows:—

First Year—Royal Veterinary College, Camden Town, N.W.1.
Second Year—Reading University.
Third Year—Holme Park, Sonning.
Fourth Year—Streatley.
Final Year—50, Friar Street, Reading, and the Reading Abattoirs.

Mr. Dunkin assisted by visiting the examination centres beforehand to see that all necessary preparations were being made, and saw to the provision of special heating apparatus.

At the other centres the examinations were normal. As there were only five candidates in the First Year at Liverpool, arrangements were made for them to take their oral and practical examinations at Edinburgh.

Owing to the restricted boat service to Dublin, most of the Examiners elected to travel to and from Ireland by air. Special travel permits had to be obtained for each Examiner to permit their entry into Ireland. The necessary arrangements were made in advance by the Secretary.

Some difficulties were experienced in planning for the written papers to be transmitted in good time from the Internal to the External Examiners. In many cases delay was occasioned by the slowness of the post. All difficulties were, however, surmounted and the time-tables were found to work satisfactorily.

. . . . .

It was resolved:—

(*a*) "That the appointment of Interim Examiners made by the President be approved."

(*b*) "That the following appointment of Internal Examiners be approved:—

Edinburgh: J. W. Burgess in Animal Management.
T. Warwick in Biology.

Liverpool: S. P. Burfield in Biology.
Professor D. B. Blacklock in Parasitology."

(*c*) "That notice be given for the consideration of an amendment to By-law 77 (4) to provide that candidates exempted from examination in one subject in the first examination shall be entitled to 'credit' if they obtain 60 per cent. of marks at the examination in the other subject."

(*d*) "That the thanks of the Council be accorded to the Universities and Veterinary Colleges for assistance given in preparing for the examinations and providing the necessary accommodaton, and that the indebtedness of the Council be especially acknowledged to the University of Reading, the Medical Officer of Health, the Chief Meat Inspector and to Mr. G. P. Male, M.R.C.V.S., for their valuable services in connection with the preparations of the oral and practical examinations."

(*e*) "That the question of the number of marks to be awarded for the written, oral and practical parts of the Final Examination be placed on the Agenda of the Committee at its next meeting."

Educational Certificates.—(*a*) A list of Educational Certificates Nos. 6523 to 6541, 6544 to 6548, 6551 to 6635, was submitted and approved.

(*b*) A letter from the Scottish Education Department was read in reference to the conditions of acceptance of the new Senior Leaving Certificate.

It was resolved: "That Sir Arthur Olver be asked to interview the Secretary of the Department on the matter and to report."

March Examinations.—It was resolved: (*a*) "That the special examination to be held in March be fixed for the following dates:—

Written: Friday, March 15th, or Monday, March 18th.
Oral and Practical: Monday, March 18th, or Wednesday, March 20th."

(*b*) "That the examination be open only to students of the Royal Veterinary College who did not take the examination in December, 1939."

Animal Management Examination.—It was resolved: "That the Animal Management Examination be held in May on a date to be fixed by the President and Chairman."

Exemptions and Concessions

By-law 62.—(*a*) Exemptions under the provisions of By-law 62 were granted in the following cases: Nos. 41, 43 to 58, 64 to 66, and 70.

(*b*) Exemption under the provisions of By-law 62 was granted in respect of the subject mentioned in the following cases: *Chemistry and Physics,* 61, 63, 69; *Biology*, 42, 59, 60, 62, 67, 68.

Bye-law 95.—Applications were received from candidates No. 71 and 72, being holders of foreign veterinary diplomas, together with the Degree of Ph.D. of the University of Edinburgh granted for theses on veterinary subjects.

It was resolved: "That candidates 71 and 72 be admitted to the prescribed Final Examination after a further attendance of one session at a British Veterinary College, the subjects of the examination to be Veterinary Medicine and Meat Inspection, Veterinary Surgery and Obstetrics and Veterinary Pathology and Bacteriology."

Refugees.—Applications were received from two refugees who had partly completed the veterinary course at Continental Veterinary Colleges, and it was resolved: "That, subject to the submission of satisfactory certificates, and to a satisfactory report from the Secretary after an interview with both applicants, these candidates be exempted from the examinations of the first two years of the course."

Mr. Dunkin: I beg to move formally the reception and adoption of that report. In doing so, I should like to emphasise what it says with regard to the thanks due from this Council to those gentlemen who were kind enough to go out of their way to help us so much with the examinations. I do not want to take up too much time, and it is not my intention to do so; but I should like particularly to refer to the amount of work done and interest taken in the examinations by a member of this Council, Mr. G. P. Male. (Applause.) Mr. Male for weeks before the examination, and not merely while it was on, took a very lively interest indeed in what was taking place and placed the whole of his establishment at our disposal, with almost no restrictions at all on what we were to do and where we were to go. I shiver to think of what would have happened to the Final Examination if we had not had the immense facilities which we were given, and the unstinted thanks of this Council are unquestionably due to Mr. Male for all that he did for us. (Applause.)

Dr. Whitehouse: I second that, and I think it would be suitable if we also expressed our appreciation of the many years of faithful service that Dr. Lander gave the Council. I suggest that that should be added to the report.

The President: I am sure the Council will agree with Dr. Whitehouse's reference to the late Dr. Lander who gave of his best for so many years as one of our examiners, and who gave of his advice so unstintingly on the many occasions it was sought. He will be sorely missed at the Examination Board, and I have personally lost an old and valued friend and former colleague.

I should like to supplement what Mr. Dunkin has said with regard to the examinations held in Reading and the very valuable support and help given by Mr. Male in the most unstinted manner, as Mr. Dunkin has pointed out. I should also like, however, to have included in that expression of thanks our gratitude to Mr. Dunkin himself. (Applause.) He had an enormous amount of work to do and gave of his time without stint before the examination in assisting in the arrangements and the provision of warmth in extremely cold weather. It was very largely due to his efforts that the examinations were carried through so smoothly.

I should like at the same time to refer to Dr. Bullock and his staff. The extra amount of work which was entailed for all of them was enormous, and the assistance that Dr. Bulloek gave to me when I had in half-a-dozen or so cases to provide at the last minute for deputy external examiners was very great. Some six or seven had to be found, and it was a very difficult task. Dr. Bullock had to spend his evenings day after day in putting through long-distance trunk calls to try to get in touch with the various people who we felt could suitably fill the vacancies. I think we can congratulate ourselves that we were able to fill the

vacancies as excellently as we did. The work involved in making all those trunk calls was very considerable, and I think we should express to Dr. Bullock and his staff our appreciation of the help which they gave so unstintingly throughout. (Applause.)

The motion, incorporating the thanks of the Council to those whose names were mentioned in the discussion, and the expression of the Council's appreciation of the services of the late Dr. G. D. Lander as Examiner in Chemistry and Physics was carried.

Library Committee

The following report of the Librarian was submitted and approved.

LIBRARIAN'S REPORT

Loans and Readers.—The Librarian reports that during the last quarter 153 works were sent out on loan. Of these, 93 were lent by post and 60 were borrowed personally. The Library was used by 43 readers and there were a few other visitors.

Special Inquiries.—These included requests for literature dealing with the following subjects: Bovine Trichomoniasis, Sewerage pollution of streams, Methylene blue reductase tests.

Printed Catalogue.—Three more copies were sold, thus bringing the total sales up to 263.

Inter-Library Loans.—It is of interest to note that no less than 24 works have been lent through the National Central Library, as against two in the previous quarter. We have borrowed five books from other libraries.

Library Service.—All the more valuable periodicals have now been stored in the basement of No. 10, where they are not only safe, but fortunately also accessible. The Library service is being maintained in the evacuated office at No. 9. Attempts are being made on our behalf by Messrs. Baillière, Tindall & Cox to obtain German periodicals through neutral countries.

Presentations.—A number of reports, calendars, year books, pamphlets and reprints have been received, together with the following books:—

Omsk Veterinary Institute, Transactions, Vol. 11, 1938.

Institut Zootechnique et Vétérinaire Kirov, Oeuvres, Vol. 3 No. 12, 1939.

Share Jones, J. T., The surgical anatomy of the horse, part 2. (Presented by J. W. E. Budge, Esq., M.R.C.V.S.).

A collection of journals from Dr. J. T. Edwards, D.Sc., M.R.C.V.S.

Purchases.—These included copies of the various Advisory and "Growmore" leaflets issued by the Ministry of Agriculture and Fisheries; also the catalogue of the Library of the Surgeon General's Office, Washington, 4th Series, IV.

It was resolved: "That the thanks of the Council be conveyed to the respective donors."

Purchases.—It was resolved: "That the Librarian be authorised to purchase Francini's Hippiatrique 1607 for the sum of £3 3s. 6d."

CHARTERED AND OTHER BODIES (TEMPORARY PROVISIONS) ACT, 1909

The Secretary submitted a report on the provisions of this Act, by which temporary powers could be obtained, to amend the requirements of Charters in such a way as might appear to His Majesty in Council to be necessary or expedient for the purposes of securing economy or efficiency in the carrying on the work of the College under war conditions.

The PRESIDENT: This is a matter of some importance. We have appointed a War Emergency Executive Committee, but it is quite possible, if we are not careful, that that Committee might unwittingly attempt to do certain work *ultra vires* and commit the Council in a way that it has no real authority to do. The Chartered Bodies (Temporary Provisions) Act allows us to make application for certain duties imposed on us by Charter to be referred to this Committee or to any other Committee that we might feel disposed to appoint. The matter has been discussed already with regard to registration, which is an instance in point.

I would ask you in the first place whether you would like to take advantage of this Act and to make an application to the appropriate body. If you decide to do so, we can then consider what powers should be applied for.

Mr. HOLROYD moved that the Council go into Committee. The motion was duly seconded and carried, and the Council went into Committee accordingly.

On resuming, it was resolved that application be made for powers to reduce the *quorum* necessary for removal of names from and restoration of names to the Register, with the suggestion that the number required to be present should be twelve, the proportion voting in favour being left as at present, namely, three-fourths.

The PRESIDENT formally moved this from the Chair, and it was agreed to.

Mr. LIVESEY: I beg to move a vote of thanks to the President for his conduct of the meeting and for all the work that he has done.

The vote of thanks was carried with acclamation, and the meeting then terminated.

IN PARLIAMENT

MEAT RATIONING

Mr. W. S. MORRISON announced in the House of Commons on Tuesday that rationing of butcher's meat would be introduced on Monday, March 11th, and that the ration would be on a value basis. At the outset the rate would be 1s. 10d. a week for each person over six years, and half that amount for children under six.

The meat supply, Mr. Morrison intimated, would be kept under close review, and the ration would be modified from time to time. Edible offals, such as liver, kidneys, tongue, and oxtail, and manufactured meats, such as sausages and meat pies, would be free of ration. Restaurants, industrial, school and other canteens, feeding centres, and all other catering establishments would be allowed in the initial period to serve meals without coupons, but their supply of butcher's meat would be restricted. Pending rationing the meat allocated to retail butchers would be approximately the same as they would be entitled to after rationing began.

. . . . .

AGRICULTURE: WAR-TIME MEASURES

On the same day Mr. COLVILLE, Secretary of State for Scotland, in the absence through illness of Sir R. Dorman-Smith, the Minister of Agriculture, moved the second reading of the Agricultural (Miscellaneous War Provisions) Bill. He said that the Bill made amendments to existing legislative machinery necessitated by war-time, and, touching on the chief provisions—including extension of the period during which grants for ploughing would be available, the adjustment of wheat deficiency payments to war conditions, and land drainage—he claimed that the Bill would give useful powers to further the war effort.

In debate, Mr. Thomas Williams could see nothing in the measure to alarm the enemy if the Bill really embodied the whole of the Government's agricultural policy in war. Mr. Lloyd George impressed upon the Government that there must be enough of everything essential to the nation in war, and he declared that there was, on the agricultural side, a yawning gap between what was needed and what the Bill provided for. It was not a Ministry of Agriculture Bill, but emanated from the Treasury, whose function was to say "No" to the other Departments. Mr. Lloyd George closed with an appeal to Parliament to demand prompt action on a great scale to save the country from disaster, because one essential measure had been forgotten.

Sir G. Davies said that the Bill should be widened to cover credit facilities.

Sir Samuel Hoare replied that it was not to be judged as if it were the Government's sole agricultural measure. He gave the assurance that the Government put home production of food into the first of our war priorities and treated it as being as urgent and vital as any of the munition programmes. The Cabinet intended to put all their weight into the effort to stimulate the ploughing-up of land. That programme was progressing satisfactorily, although bad weather had retarded it.

The Bill was read a second time without a division.

. . . . .

Treasury and Farm Credits

Suggestions that the Treasury had deliberately opposed every attempt by the Minister of Agriculture to obtain credit facilities for farmers were made by Mr. De la Bere (Evesham) in the House of Commons recently.

Mr. De la Bere had previously put forward a plan whereby the Government should give a guarantee to the joint stock banks indemnifying them against loss, on the grounds that they would be prepared to advance money to farmers at ½ per cent. above the current rate for the purchase of stock.

Sir John Simon replied by reminding Mr. De la Bere of previous statements by the Minister of Agriculture.

Mr. De la Bere: "Is Sir John Simon aware that the question of credits to agriculture has been under consideration by the Government for four years? Is he aware that the Minister of Agriculture has responsibility but no power, and that the Treasury have every time 'stymied'—deliberately 'stymied'—all initiative on the part of the Ministry of Agriculture to get something done for the farming community?"

Sir John Simon: "I do not want to contradict, but I would say there is nothing further from the facts than to say that the Treasury has persistently opposed the Minister of Agriculture."

Mr. De la Bere: "Is Sir John Simon aware that I was present at one of the conferences, and that the whole line of resistance came from the Treasury; that this is 100 per cent. true and it is absolutely at variance with the known facts to suggest otherwise?" Sir John Simon did not reply.

The following are among the further questions and answers recorded in the House:—

Poultry Industry

Sir Francis Fremantle asked the Minister of Agriculture whether it is the settled war-time policy of the Government to encourage the dispersal of the flocks of specialist poultry keepers amongst general farmers, cottagers and back-yarders; and whether this is intended to increase the supply of eggs and poultry required for general consumption in the war?

The Minister of Agriculture (Sir Reginald Dorman-Smith): The general policy of the Government was stated in the announcement of November 22nd last, a copy of which I am sending to my hon. Friend. A process of adjustment in the poultry industry is inevitable under war-time conditions and although there is likely to be some reduction in the output of eggs and poultry from specialist holdings, an increase in output is expected from other sources which should compensate to some extent for the decline from the former class.

Sir F. Fremantle: Does my right hon. Friend recognise that chickens and eggs are the basis of convalescent diet, and that, therefore, they would be required to a greater extent than in peace-time in case of really serious casualties in the war?

Mr. Leslie Boyce: Is not my right hon. Friend aware that the proposed method of dispersal of poultry-keeping will seriously reduce the quantity and the distributive facilities of the eggs available and will result in time in acute shortages in the more populated centres?

Sir R. Dorman-Smith: We have to try and utilise all our supplies of feeding stuffs to the best possible advantage.

Sir F. Fremantle: Can some special effort be made to supply feeding stuffs now that the hatching season is due to begin?

. . . . .

Grassland Ploughing

Mr. Graham White asked the Minister of Agriculture whether the agricultural committees, in deciding which land is to be ploughed out, act on the principle of securing the best land for the purpose or on the principle of equality of sacrifice between farmer and farmer?

Sir R. Dorman-Smith: The War Agricultural Executive Committees have been given complete discretion in their selection of grassland to be ploughed up in their respective counties. In many cases the task of selection has been made easier by the fact that farmers have offered to plough up grassland voluntarily and, in such cases, the service of ploughing directions has been no more than a necessary formality. Where committees have had to select the land to be ploughed, the primary consideration has been to select land that would produce a crop for this year's harvest, but the latitude allowed to farmers in the choice of the crop to be grown is such that there may not be any question of sacrifice. This is particularly the case when a stock farmer ploughs up grassland for the purpose of growing a fodder crop, thus becoming less dependent on purchased feeding stuffs.

Mr. W. Roberts: Is it not a fact that most county committees have applied a somewhat rigid rule of 10 per cent. of the grassland on each farm?

Sir R. Dorman-Smith: I would not accept that figure.

Mr. T. Williams: May we take it that all farmers with grassland available are being treated equitably by the district committees?

Sir R. Dorman-Smith: Each farmer is supposed to make his contribution to the scheme.

. . . . .

Feeding Stuffs (Maximum Prices) Order

Mr. De la Bere asked the Chancellor of the Duchy of Lancaster what steps he is taking to enforce the Maximum Prices Order for cattle feeding stuffs, in view of the known instances of many infringements which have been taking place?

Mr. Lennox-Boyd: All complaints of breaches of the Feeding Stuffs (Maximum Prices) Order are investigated by my Department. Out of over 100 complaints examined, only five cases have presented *prima facie* evidence of a breach of the Order. Investigation is still proceeding in these cases.

Mr. W. Roberts asked the Chancellor of the Duchy of Lancaster whether, in order to protect farmers from excessive charges for compound cakes and mixed meals, he will provide that provender merchants must, on request, inform a customer of the actual ingredients of such compounds and mixtures?

Mr. Lennox-Boyd: Article 14 (2) of the Feeding Stuffs (Maximum Prices) Order, 1940, provides that every

seller of a mixture shall, on demand being made of him in writing by the buyer, furnish written particulars specifying the composition of the mixture, the price of each of the ingredients and any additional charges permitted by the Order or shall, in lieu of furnishing such particulars, furnish to the buyer an auditor's certificate certifying that the price charged for the mixture is in accordance with the Order. This provision does not apply to compound cakes as it is not considered that it would be justifiable that manufacturers should be required to disclose the composition of their products, many of which are proprietary articles. The Order, however, prescribes the maximum charge that may be added by the manufacturer to the cost of the ingredients of compound cakes. Any cases of complaint will be investigated by my Department.

. . . . .

Pigs (Allegations of Cruelty)

Sir R. Gower asked the Chancellor of the Duchy of Lancaster whether his attention has been called to the allegations of cruelty in the numbering of pigs under Government control at Wickford Market, Essex, owing to the use of pincers which are applied to the ears of the animals; and whether he has any statement to make?

Mr. W. S. Morrison: My attention has been called to the matter, and I am having inquiries made. I will communicate with my hon. Friend as soon as I am in a position to do so.

NOTES AND NEWS

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

Feb. 12th.—Meeting of the Editorial Committee, N.V.M.A., at 36, Gordon Square, W.C.1, 4 p.m.

Feb. 15th.—Meeting of Derbyshire Division, N.V.M.A., at Sutton Bonington, 2 p.m.

Feb. 24th.—Annual Meeting of the Scottish Metropolitan Division, N.V.M.A., at Edinburgh, 11 a.m.

Feb. 28th.—Annual General Meeting of the Lancashire Division, N.V.M.A., at Manchester, 2.30 p.m.

Feb. 29th.—Voting Papers issued to overseas members (R.C.V.S. Council Election).

Mar. 18th.—R.C.V.S. Examinations at Reading.

April 1st.—R.C.V.S. Annual Fees due.

May 9th.—Last date for nominations, R.C.V.S. Council Election.

May 14th.—Provisional date for commencement of R.C.V.S. Animal Management Examination.

May 23rd.—Issue of R.C.V.S. Annual Report and Voting Papers.

May 30th.—Last date for receipt of R.C.V.S. Council Election Voting Papers.

June 6th.—**R.C.V.S. Annual General Meeting.** Victoria Veterinary Benevolent Fund Annual General Meeting.

June 27th.—R.C.V.S. Written Examinations begin.

July 3rd.—Provisional date for commencement of R.C.V.S. Oral and Practical Examinations.

Appointment of Mr. L. B. A. Grace, M.R.C.V.S., D.V.S.M., to the Ministry of Food

Our readers will have noted that in the proceedings of the meeting of Council, N.V.M.A., reported in our issue of February 3rd, reference was made to the Memorandum on Meat Inspection Services which had been submitted to the Ministry of Food. One of its principal recommendations concerned the appointment of expert professional advisers within the Ministry of Food.

In this connection we are pleased to learn that Mr. L. B. A. Grace, Veterinary Officer and Chief Meat Inspector to the Corporation of the City of London, at Smithfield, has been seconded for duty to the Ministry of Food, Westminster House, Horseferry Road, S.W.1. Mr. Grace has taken up his appointment as Technical Adviser on Meat Inspection Services. Mr. Grace was appointed to Smithfield in 1934, in succession to Lt.-Col. Dunlop Young. He had been employed in the City of Cardiff previously and earlier was Veterinary Education Officer for Derbyshire. Mr. Grace has a wide knowledge of all that pertains to the technique and practice of meat inspection. He is also an authority upon imported meat, and is consequently well fitted to carry out the duties of his new office. Our readers will appreciate that Mr. Grace has accepted a position carrying heavy responsibilities calling for the full exercise of his ability: we wish him every success in this new sphere.

Since this is the first appointment of a veterinarian to the Ministry of Food, we wish to express our great satisfaction that the claims of the veterinary profession are now receiving official recognition. We feel convinced that the National Veterinary Medical Association will continue to urge that its other recommendations should be implemented at the earliest moment; the Association is, however, gratified that the first of the appointments envisaged in the Memorandum has been made.

. . . . .

Slaughterhouse Scheme and Meat Inspection Service

In connection with the foregoing announcement of Mr. Grace's appointment, the following editorial note in the current issue of the *Meat Trades Journal* is of interest:—

"In our issue of January 25th we called attention to the fact that apparently neither the Ministry of Food nor the Ministry of Health had appointed qualified officials able to provide an inspection service for the extra slaughtering which will now be done in many areas." [We quoted in our last issue from the observations made by the *Journal* on this matter.—*Editor, V.R.*] "In a letter which appears on another page of this week's issue the Sanitary Inspectors' Association take exception to our statement and say that we are 'surely aware that it is a statutory duty of every local authority to appoint one or more sanitary inspectors for their district and these officials are qualified to carry out the duties of meat inspection.' We agree we are aware of the statutory obligation, but we are not aware that all sanitary inspectors 'are qualified to carry out the duties of inspection,' neither are we aware that those who are qualified are able, taking into consideration their other duties and the extent of the area they cover, to give adequate service as meat inspectors. There are many cases where the sanitary inspector is charged with all the public health duties of areas covering up to 26 square miles, including innumerable slaughterhouses. In one instance we have in mind, we believe we are right in stating there are 19 parishes with a slaughterhouse, sometimes two, in each parish. Owing to the scattered nature of the district and the smallness of the total population, an adequate inspection service would mean a 3d. rate. Furthermore, some of the inspection would be of meat ultimately consumed outside the area. On this matter we may well ask how it is that the City

of London and adjacent boroughs have frequently had to take action with regard to unsound meat sent from rural areas, if the inspection service in those areas has been adequate. The meat trade is particularly interested in this question, as where unsound meat does get through, invariably the butcher is blamed.

"Apparently the Ministry of Food recognises the danger, as we find that while we were writing our previous article they were appointing Mr. L. B. A. Grace (Chief Meat Inspector for the City of London) as technical adviser on health inspection of meat."

* * * * *

John Boyd Dunlop Centenary

Monday last, February 5th, was the centenary of the birth of John Boyd Dunlop, M.R.C.V.S., the skilled veterinarian and great inventor, who produced and patented the pneumatic tyre in 1888. It is a sad coincidence that in our issue of February 3rd we had to record the death of Mr. Ewing Johnston, who worthily carried on a great veterinary tradition in the May Street premises, in Belfast, first made famous by Dunlop.

A memorable tribute to the life and work of J. B. Dunlop, from the pen of his daughter, Mrs. Jean W. McClintock, appeared in our issue of November 5th, 1938, the jubilee year of his invention, by means of which, as has been truly said, he "put the world on wheels." Sir George Beharrell, unveiling a plaque to his memory at Fort Dunlop on November 17th of that year, said that, like the steam engine and the electric cell, that invention had revolutionised our daily life; it was the greatest contribution to transport since the invention of the wheel itself.

* * * * *

National A.R.P. Animals Committee

LECTURES AT THE ROYAL VETERINARY COLLEGE

The third of the series of lectures being given by Mr. H. E. Bywater, M.R.C.V.S., in the Beaumont Lecture Theatre at the Royal Veterinary College, will be delivered on Tuesday next at 2.30 p.m., when Mr. Bywater will deal with Blister Gases and Protective Clothing. It is hoped that veterinary surgeons will attend as many of these lectures as possible.

* * * * *

R.C.V.S. OBITUARY

HOBSON, Thomas Harry, T.D., F.R.C.V.S., Major, late R.A.V.C. (T.F.), 87, London Road, Leicester. Graduated London, June 22nd, 1886; Fellowship October 27th, 1892. Died January 30th, 1940; aged 75 years.

REA, Christopher, Talbot Street, Tramore, Waterford, Eire. Graduated London, April 10th, 1888. Died January 16th, 1940, aged 73 years.

SCOTT, Robert, 13, Oliver Crescent, Hawick, Roxburgh. Graduated N. Edinburgh, April 13th, 1887. Died February 1st, 1940; aged 72 years.

TART, William John, 56, Trentham Road, Longton, Staffordshire. Graduated Edinburgh, May 18th, 1898.

* * * * *

Major T. H. Hobson, T.D., F.R.C.V.S.

It is with the utmost regret that we record above the passing of Major Thomas Harry Hobson, whose loss will be mourned by the very wide circle of close friends his kindly geniality had gained for him in the profession and beyond. A prominent member of the Midland Veterinary Association of long standing, he was also a staunch supporter of the parent body, few, if any, of the members of the "National" being more consistently regular in their attendance at the Annual Congress. His presence there had, indeed, come to be regarded as a feature of the occasion by the many who looked forward to this opportunity of meeting him, and he will be missed sorely.

Major Hobson was in practice for 50 years, retiring in 1937 owing to ill-health.

For many years he served with the Leicestershire Yeomanry as veterinary officer prior to the last war, and during that war was attached to the Royal Army Veterinary Corps. On attaining the age limit he retired with the rank of Major and with the Territorial decoration.

He was a prominent Freemason, and in addition to membership of various lodges was senior steward of St. John's Lodge for 21 years.

Major Hobson will be best remembered in his professional capacity as veterinary surgeon to the Corporation of Leicester and to the L.M.S. and L.N.E.R.

On behalf of the profession we would express to Mrs. Hobson and their daughter, the wife of Mr. Harry Thornton, veterinary surgeon of Leicester, the deepest sympathy in their bereavement.

* * * * *

FEEDING STUFFS CONTROL: DEALERS TO BE LICENSED

The Minister of Food has made the Feeding Stuffs (Licensing and Control) Order, 1940, which prohibits, except under licence, the purchase or sale of feeding stuffs in Great Britain after February 29th, 1940, by any dealer—*i.e.*, any importer, manufacturer, wholesale dealer, or distributing dealer. The Order does not apply to Northern Ireland.

A general licence has been issued under this Order covering any dealer whose total sales of feeding stuffs in the datum year (July 1st, 1938, to June 30th, 1939) did not exceed 500 tons; consequently such persons need take no action to secure a licence.

Individual licences to trade are required by all dealers in feeding stuffs whose sales in the datum year exceeded 500 tons. It is the intention in general to issue licences to all established dealers. Any such dealer who wishes to continue to trade after February 29th should, therefore, complete an application form for a licence and forward it to the Animal Feeding Stuffs Division, Ministry of Food, Great Westminster House, Horseferry Road, London, S.W.1.

It should be noted that certain manufacturers who produce feeding stuffs as by-products are not required to obtain licences for the sale of their by-products as such.

Under the Order all licencees, whether general or individual, must keep accurate records of their dealings and must furnish the Minister of Food with such information and returns as he may require.

* * * * *

CONTROL OF MEAT: TWO DIRECTORS APPOINTED

The Minister of Food has appointed two directors to succeed Sir Francis Boys, who resigned from the post of Director of Meat and Live Stock on January 31st. It was pointed out at the Ministry of Food that Sir Francis Boys, who is now 70 years of age, was Director of Meat Supplies in the last war, and it was well understood that, while he was prepared to return to get the new scheme of control working, subsequently he would wish to make way for a younger man. This he has done, and the Minister is indebted to him for his work in preparing the scheme, which, incidentally, is always referred to inside the Ministry, as the Boys scheme, a measure of the recognition accorded its author within the Department.

As the work of controlling supplies of meat is so heavy—too heavy for any one man—and is divided naturally into two sections, the Minister has appointed to succeed Sir Francis Boys Mr. H. S. E. Turner as Director of Live Stock and Home Produced Meat, and

Mr. R. S. Forsyth as Director of Imported Meat. Both have had considerable experience of the meat trade both in this country and in New Zealand. Mr. Turner, who started as a Civil servant and afterwards entered business, has been working as deputy director under Sir Francis Boys, to which post, under an arrangement made beforehand with the Ministry of Food, he came from New Zealand on the outbreak of war.

Mr. Harold Jones is to be Deputy Director of Imported Meat.

* * * * *

PERSONAL

Marriage.—CAMPBELL—WEIR.—At Pollokshields, Glasgow, on January 24th, 1940, by the Rev. Henry Taylor, M.A., Alistair, son of the late Malcolm Campbell and Mrs. Fisher, Langside, to Nan, daughter of Professor George W. Weir, J.P., M.R.C.V.S., and Mrs. Weir, 131, Shawmoss Road, Maxwell Park.

* * * * *

FOWL CHOLERA OUTBREAK IN SOUTH SCOTLAND

In a recent announcement the Ministry of Agriculture draws the attention of all poultry owners in Lanark, Midlothian, West Lothian and Dumbarton to the existence of fowl cholera, which has been diagnosed in a number of flocks in these counties. This disease attacks all types of domestic poultry and some wild birds, and is capable of causing very severe losses among them.

All poultry keepers are advised to keep a constant watch on the health of their flocks, and immediately to investigate any unusual mortality by sending one or two specimen carcases for examination at a poultry laboratory. The County Poultry Instructor should be consulted if any particular difficulty is experienced in this connection.

In order to prevent the further spread of infection, the following precautions should be adopted by *all* owners of poultry in or near the above-mentioned counties:—

1. When possible purchase live birds only from sources which are known to be free from disease.

2. With every newly purchased lot of birds mix one or two low-value birds of the home flock and keep them together in isolation for 14 days. Any illness or death amongst them should be investigated without delay.

3. Make sure that all crates and other receptacles used for birds are at once thoroughly disinfected, in compliance with the Poultry Markets and Receptacles (Disinfection) Order of 1936.

An advisory leaflet (No. 19) on fowl cholera is published by the Ministry and a copy will be sent post free on application to the Ministry of Agriculture, 10, Whitehall Place, London, S.W.1.

* * * * *

The *Daily Telegraph* reports the death, in a Nazi concentration camp, of Prof. Michael Siedlecki, the well-known biologist of the Cracow University. Prof. Siedlecki held honorary chairs of biology at the universities of Strasbourg and Brussels. He was also a prominent member of the Cracow Academy of Science, and Polish delegate to the International Council of Marine Exploration.

* * * * *

It is announced that the Ascot Meeting will not be held this year. During the last war a substitute race for the Gold Cup was run at Newmarket.

SUPPLEMENTARY RATIONS FOR INVALIDS

The Medical Research Council has appointed an expert committee to advise from time to time whether it is necessary on medical grounds to modify or supplement rations in the case of invalids and other persons on special diets. On January 24th, the Minister of Food announced that, provided adequate supplies of vitaminised margarine were available, the committee did not consider that the present rationing regulations necessitate provision of extra rations of any food for cases of diabetes mellitus or of any other diseases. In view of this authoritative pronouncement, there were no grounds for the issue of such supplementary allowances at the present time.

* * * * *

B.M.A. COMMITTEE ON NUTRITION

The constitution of the committee set up by the British Medical Association to consider war-time problems of nutrition has been announced. It is as follows: Professor V. H. Mottram, Professor of Physiology in the University of London; Professor E. P. Cathcart, Regius Professor of Physiology, Glasgow University; Professor S. J. Cowell, Professor of Dietetics in the University of London; Dr. J. H. Harley Williams, National Association for the Prevention of Tuberculosis, Central Council for Health Education; Dr. Maitland Radford, Medical Officer of Health for St. Pancras; Sir Kaye le Fleming, late Chairman of Council, B.M.A.; Dr. Wilfred J. Pearson, Physician-in-Charge, Children's Department, University College Hospital; Dr. J. C. Spence, of Newcastle.

CORRESPONDENCE

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

The views expressed in letters addressed to the Editor represent the personal view of the writer only and must not be taken as expressing the opinion or having received the approval of the N.V.M.A.

* * * * *

TUBERCULIN TESTING: A DISCONCERTING EXPERIENCE

To the Editor of the Veterinary Record

Sir,—I wish to draw the attention of all those interested in tuberculin testing to the following incident—and I feel sure that the N.V.M.A. Committee on Tuberculin Testing will give due consideration to the facts.

First let me say that I use the single intradermal test in the caudal fold as a routine for all testing on my clients' private account, my experience with this test in Canada, where it is the regulation Government technique, having shown to my satisfaction that it is as efficient as, if not more so, and certainly less cumbersome and time-consuming than, the double intradermal test on the neck.

During a re-test of a herd on November 4th, 1939, I included some reactors from a previous test and was very considerably shocked when they all failed to show any reaction. I was using R.V.C. tuberculin, batch 69. I arranged to re-test the reactors using an English-made tuberculin that I have always found to be potent, and on December 23rd I carried out my observation, when all the cows again showed a positive reaction. Of course I then re-tested the whole herd free of charge.

I bring this matter forward to emphasise the paramount importance of having all tuberculin made to conform to a standard, as otherwise these incidents are certain to occur. They always give rise to the gravest aspersions being cast upon the efficiency of the tuberculin test; especially was this so in this case, where tuberculin of the same make as is the Government regulation for official tests was being used.

Yours faithfully,

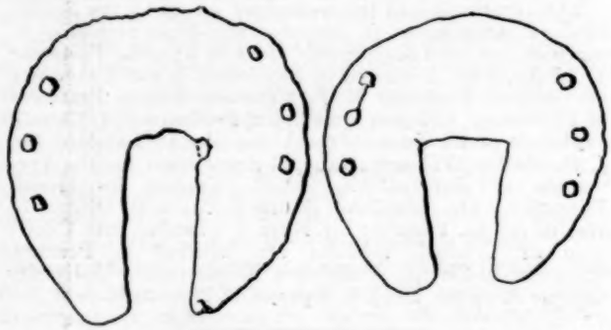
G. S. Muir.

Greenmount,
Needham Market,
Suffolk.

PROTECTIVE PLATES FOR HORSES IN WAR

To the Editor of the Veterinary Record

Sir,—I have been reading with great interest Mr. R. C. G. Hancock's paper on protective plates for war horses. I have a fairly large collection of ancient horse-shoes as well as about 2,500 drawings of those exhibited in public collections, etc. These include only a single plate intended to be used as he describes. It is made of copper and came from a village smithy. But the two drawings which I enclose seem to have combined the horse-shoe and the plate. They have no history but I suppose that they are derived from some circular Arab type. They are cut-out plates, not forged, although a small calkin has been formed on one of them.



In the eighteenth century there was a sort of shoe in common use which undoubtedly protected the soles but was so monstrously heavy and clumsy that it is difficult to understand how its use could become so general as it did. This shoe was in shape very similar to the plate described by Mr. Hancock, but I am sure that he would not have approved a weight of 20 to 30 oz. for the draft horse of those days.

Although the shoes which I have drawn look very similar, there are really considerable differences. That on the right has circular nail holes punched from the hoof surface. The circular holes placed close together are very strongly suggestive of Arab origin. The shoe on the left has rectangular holes of European time and a calkin which looks like a European feature of some 500 years ago or more. I should be glad of any information about these types.

Yours sincerely,
Gordon Ward.

7, Pembroke Road,
Sevenoaks.

* * * * *

EARLY SEPTICAEMIA IN ANTHRAX

To the Editor of the Veterinary Record

Sir,—A case occurs to me which fully bears out Mr. Barron's contention that bovines may survive for some time subsequent to an infection with *B. anthracis*. I was called some years ago, as a County Inspector, to report on a bullock whose *post-mortem* appearance suggested anthrax. The animal had been ill, with no symptoms other than general malaise, for *four days*, and at no time had the temperature risen above 103·4° F. Smears revealed an extensive infection with *B. anthracis*, which finding was subsequently confirmed by the Ministry of Agriculture.

Yours, etc.,
Paul Crosfield.

Chipping Norton,
Oxon.
February 4th, 1940.

* * * * *

WINDSOR LAD

To the Editor of the Veterinary Record

Sir,—I am pleased to find myself at last in entire agreement with my learned friend Professor McCunn! It is in regard to the intention expressed in the final paragraph of his letter which appears in the current issue of the *Record*. It was my last wish, when writing my former letter, to initiate, and most certainly not my intention—as it still remains—to pursue a correspondence on this subject.

May I take this opportunity to thank you, Mr. Editor, for the kindly explanatory note in the same issue indicating how the paragraph to which I took exception came to be published.

Believe me, dear Sir,
Yours faithfully,
E. Brayley Reynolds.

Newmarket,
February 5th, 1940.

DISEASES OF ANIMALS ACTS, 1894 to 1937, and AGRICULTURE ACT of 1937 (PART IV)

SUMMARY OF RETURNS

Period.	Anthrax.		Foot-and-Mouth Disease.		Parasitic§ Mange.		Sheep Scab.	Swine Fever.	
	Out-breaks con-firmed.	Animals attacked.	Out-breaks con-firmed.	Animals slaugh-tered as diseased or ex-posed to infection.	Out-breaks reported by the Local Authori-ties.	Animals attacked.	Out-breaks con-firmed.	Out-breaks con-firmed.	Swine slaugh-tered.
	No.	No.	No.	No.	No.	No.	No.	No.	No.
Period 1st to 15th January, 1940	21	22	4	483	4	6	23	190	78
Corresponding period in									
1939	37	39	11	1,896	1	1	22	42	27
1938	51	51	32	4,640	6	10	30	16	11
1937	29	33	1	59	8	8	36	49	17

Note.—The figures for the current year are approximate only. § Excluding outbreaks in Army Horses.

Contents

PAGE

GENERAL ARTICLES:
The Horse in War-time. I.—The Economics of Horse Maintenance ... BRENNAN DEVINE 119
Investigations into the Control of Blackhead in Turkeys ... ... K. D. DOWNHAM 120

CLINICAL COMMUNICATION:
Abdominal Hernia in a Cat ... ... H. KIRK 122

EDITORIAL:
"Cures" for Contagious Bovine Abortion ... 123

REPORT:
Replacement of Meals in Pig Feeding by Home-grown Foods: Results of the "Lehmann System" Experiments (Rep. Pig Experiments Co-ordinating Committee) 123

ABSTRACTS:
I.—*Brucella abortus* Infection in Goats (Doyle, T. M.); II.—An Estimate of a Suitable Infective Dose of *Br. abortus* for Immunisation Tests on Cattle (McEwen, A. D., Priestley, F. W., and Patterson, J. D.); III.—The Demonstration of Immunity in Cattle Vaccinated with a Non-virulent Strain of *Br. abortus* (McEwen, A. D.) S. J. E. 125
Diaphragmatic Hernia in Equines, not of Traumatic Origin (Trum, B. F.) ... ... D. D. O. 126
Investigations on Johne's Disease of Sheep (McEwen, A. D.) ... ... S. J. E. 126
Effect of Some Short-acting Barbituric Acid Derivatives on Intestinal Activity *in vivo* (Burstein, C. L.) ... ... D. D.O. 127

PAGE
Production of Experimental Osteomyelitis in Rabbits by Intravenous Injection of *Staphylococcus aureus* (Thompson, R. H. S., and Dubos, R. J.) ... ... D. D.O. 127

REVIEW:
Anatomy of the Sheep's Brain (E. A. Briggs) ... 127

IN PARLIAMENT 128

R.C.V.S. OBITUARY:
Major-General Sir John Moore, K.C.M.G., C.B., F.R.C.V.S. 130
Major-General W. Dunlop Smith, C.B., C.M.G., D.S.O., M.R.C.V.S. 133

NOTES AND NEWS:
Diary of Events 133
Adviser on Animal Health to the Colonial Office: Appointment of Mr. John Smith, O.B.E., M.R.C.V.S., D.V.H. 133
N.V.M.A. Congress and Annual General Meeting, 1940 134
A Historic Occasion 134
National A.R.P. Animals Committee 134
Personal 134
Food Policy of the Cabinet 134
Credits for Farmers 134
Legal Notes: The Camel a Domestic Animal ... 135

CORRESPONDENCE:
Meat Inspection Service ... JOHN C. GRANT 136
Early Septicaemia in Anthrax ... N. P. MALE 136
Old Servants of the Royal Veterinary College JOAN O. JOSHUA and RUTH TEVERSON 136
A. B. MACINTYRE 136

FILISOL CAPSULES

Under the name "FILISOL" we have introduced a purified Extract of Male Fern containing over 30 per cent. of Filicin, in capsule form, which is much superior to the B.P. Extract. These have been used with marked success by numerous Veterinary Surgeons who have stated that by the use of this remedy they have saved flocks of sheep. These capsules are made in England, are moderate in price, and are never supplied to farmers, etc., but only to the veterinary profession. Circular with table of doses for sheep and cattle post free on application.

Filisol Capsules,

15 min., 1/3 doz., 7/6 per 100.
30 min., 2/3 doz., 14/- per 100.

For Cattle,

45 min., 3/- doz., 20/- per 100.

CARBON TETRACHLORIDE CAPSULES

At the Annual Congress of the National Veterinary Medical Association, a Veterinary Officer of the Department of Lands and Agriculture, Dublin, recommended pure Carbon Tetrachloride in capsules. Fasting does not appear to be essential. He suggested that a single dose of 6 to 10 c.c. would probably be effective and safe for a sheep of any age.

Price:

10 min.,	2/- per 100	17/- per 1000
15 ,,	2/9 ,,	23/6 ,, ,,
1 c.c.	3/- ,,	24/- ,, ,,
20 min.,	3/6 ,,	28/- ,, ,,
30 ,,	4/6 ,,	38/- ,, ,,
2 c.c.	4/6 ,,	38/- ,, ,,

For Cattle,

75 min., 1/9 doz., 12/- per 100.

TETRALENE CAPSULES

(Ethylene Tetrachloride). Coloured red. Ethylene Tetrachloride has been recommended as superior to Carbon Tetrachloride in the treatment of Nematoda, such as round and thread worms in dogs, cats, poultry, pigs and sheep.

The dose should be given after the animal has fasted for twelve hours, and no food or water for at least two hours after the dose.

DOSES.

Young Puppies, for each 2 lb. weight, one 3 minim capsule.
Cats and dogs, for each 8 or 10 lb. weight, one 16 minim capsule.
Dogs, 25 to 30 lb., one 40 minim capsule.
,, 50 lb., one 75 minim capsule.
Fowls, one 16 minim capsule.
Pigs, over 6 weeks old, one 16 minim capsule.
,, 50 lb. weight, one 40 minim capsule.
,, 150 lb. weight, one 75 minim capsule.
Lambs, one 40 minim capsule.
Sheep, one 75 minim capsule.

Tetralene Capsules.

3 min.,	6d. doz.;	3/- 100 ;	25/- 1000
16 ,,	1/- ,,	7/- ,,	65/- ,,
40 ,,	1/9 ,,	12/6 ,,	
75 ,,	3/- ,,	20/- ,,	

C. J. HEWLETT & SON, LTD. Wholesale and Export Druggists and Surgical Instrument Makers

35-43, CHARLOTTE ROAD and 83-85, CURTAIN ROAD, LONDON, E.C. 2.

LIBRARY
Agricultural & Mechanical College of Texas
College Station, Texas

Factors in Canine Nutrition

[No. 7]

Vitamin A—(continued)

Vitamin A is found in fish, mammalian livers, and ADMIN, and its precursor, beta-carotene, in some vegetables. It is a vitamin most unstable in the presence of air. Carnivores that in a natural state devour the liver and guts of their prey would get a sufficiency, but muscle meat provides vitamin A in inadequate amounts. Unless modern dog diet is reinforced in this respect, it will undoubtedly fall short of the optimum in this important vitamin and may well be dangerously deficient. Vitamin A is stored in the liver, and in cases of deficiency twice or three times the normal requirements should be given to build up the depleted reserves. There is very little chance of overdosage, but the first sign will be a looseness of the bowels.

What Admin Contains

ADMIN contains a minimum per pound of 15,625 international units of vitamin A; 3,906 international units of vitamin D; 2,510 international units of vitamin B.1; and proportional amounts of the rest of the vitamin B complex and vitamin E, which have as yet no international standard. It supplies assimilable calcium, phosphorus, iron, copper, manganese, and iodine in the optimum quantities and proportions

PACKETS 6d. and 1/6 (about ¼-lb. and 1-lb. respectively) are sold to the general public through chemists and corn chandlers. The 7/6 tin (containing about 7 lb.) is supplied to members of the veterinary profession at the special price of 5/6. Orders of 3 tins and over are sent carriage free.

ADMIN FORTIFIES FOOD

Issued by COOPER McDOUGALL & ROBERTSON LTD, BERKHAMSTED, HERTS